SUGAR EXPORT PRICE AND IMPORT TARIFF REFORMS: A COMPUTABLE GENERAL EQUILIBRIUM ANALYSIS OF MAURITIUS

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This study employs a multisectoral computable general equilibrium model of Mauritius designed to explore the economic consequences of the removal of the preferential pricing agreements for Mauritius' sugar exports by the European Union, the United States, or jointly. This is performed with endogenous tax changes in the distortionary value-added taxation or the lump-sum taxation to maintain a constant government budget. Each sugar export price change affects other sectors and lowers welfare in most cases. Mauritius' greatest gain comes from the removal of the preferential price by the United States with value-added tax replacement. However, unilateral tariff liberalization with the European Union, the Southern African Customs Union, the United States and the Southern African Customs Union jointly, and with all of Mauritius' trade constituents yield further decreases in Mauritius' welfare when combined with sugar export price changes. The country is most adversely affected in the full tariff liberalization case with value-added tax replacement, where region-specific unilateral trade is usually better than unilateral global free trade.

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PREFACE

"Trust in the Lord with all thine heart; and lean not unto thine own understanding. In all thy ways acknowledge Him, and He shall direct thy paths," (Proverbs 3:5-6).

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"With men it is impossible, but, not with God: for with God all things are possible," (Mark 10:27).

1.0 INTRODUCTION

Mauritius has been deemed the miracle child or success story of Sub-Saharan Africa by many researchers due to the country's sustained economic growth.[1] However, there are some important economic changes on the horizon, some of which are beyond the control of the Mauritius policymakers. One major change that Mauritius faces, but cannot avoid, is losing its lucrative preferential sugar pricing agreements with the European Union and with the United States.[2] Another potential change, which policymakers can alter, is the establishment of reciprocal or free trade areas with its key trade partners. Both the change in an important commodity's export price as well as import tariff removal for some or all of its trade partners can each have substantial, economy-wide impacts individually.[3]

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[1] Dabee and Greenway, 2001, p. 1; Subramanian and Roy, 2001, p. 1; Milner and McKay, 1996, p. 71; and World Bank, 2002, p. 9.

[2] Exports of sugar to the EU and US have garnered prices 1.0-4.6 times the world price over the period of the agreements that define the trade of the commodity.

[3] Holland, Figueroa, and Gilbert, 2001, p. 293 review the relative importance of Chilean agricultural and food processing industries, focusing on sales across different sectors that are driven by agricultural commodity exports. Reddy and Yanagida, 1998, p. 73 states how the loss of preferential price of sugar exports for Fiji would call for changes at the micro and macro level, inferring that both sectoral and economy-wide shifts may occur. Sirawardana, 1995, pp. 51, 78 shows how falling export commodity prices (wheat and wool) are one of the direct causes of the recession in Australia in the 1930s. Taylor, Yúnez-Naude, Hampton, 1999, p. 463 states how maize price reductions in Mexico reduces maize productivity, increases the output in livestock and non-agricultural production, but decreases the shadow price of land and family labor. Beghin and Karp, 1992, p. 295 displays how tariff reductions have an economy-wide effect through other sectors buying tariff ridden imports as inputs. Rege, 2001, p. 125, discusses how any reduction in tariff revenues will affect the macro balance of the economy, lowering revenues and thus adjusting the government surplus or deficit. Xu and Chang, 2000, p. 157 presents the profound impact tariff cuts will have on the Chinese economy's unemployment rate.

However, the theory of the second best suggests that adding a distortion, e.g. an import tariff, in an economy where other distortions are already present (indirect taxes, quotas, subsidies, etc.) may actually increase welfare if it moves resources to where their value of marginal product is higher than the initial, distorted equilibrium level. Conversely, removing one distortion in the presence of a second distortion will not necessarily increase welfare in a country.[4] It is possible that the loss of preferential pricing of sugar together with tariff cuts may increase or decrease national welfare given the theory of the second best. So the question arises: In light of the inevitable loss of sugar preferences, how might Mauritian policymakers best select from their trade policy options now being discussed? Therefore, this study will quantify for Mauritius the national welfare effects of the following policy changes: reduction of preferential pricing of sugar exports to world prices in isolation and then coupled with either unilateral free trade with the European Union (EU); the Southern African Customs Union (SACU); the United States (U.S.) and the Southern African Customs Union; and with all of its trade constituents to assess what reform, if any, dominates and which policy or set of policies are most welfare-improving.[5] The methodology adopted is that of a computable general equilibrium (CGE) model.

[4] Markusen, Melvin, Kaempfer, and Maskus, 1995, p. 149; Hanson, Robinson and Tokarick, 1993, p. 41.
[5] The European Union is comprised of 15 countries in this study (EU-15): Austria; Belgium; Denmark; Finland; France; Germany, Federal Republic of; Hellenic Republic; Ireland; Italy; Luxembourg; Netherlands; Portugal; Spain; Sweden; and the United Kingdom. The Southern African Customs Union is Botswana, Lesotho, Namibia, South Africa, and Swaziland. The United States is simply itself and the Rest of the World comprises all of Mauritius' trade partners, non-inclusive of the EU-15, SACU, and the United States.

1.1 THE CURRENT POLICY ENVIRONMENT

Mauritius gains considerable export revenues from the preferential trade agreements (PTAs) pertaining to sugar with the European Union and the United States and that Mauritius has a high dependence on tariff revenues. As a result, the reverberations of the loss of sugar pricing and trade liberalization can spark significant economy-wide changes.

1.1.1 Sugar's Importance in the Economy

A pivotal commodity for the Mauritian economy is sugar. Sugar's importance in the economy can be shown through its earnings through preferential trade agreements. Next, it can also be shown through its share of gross domestic product, total export revenue earnings and total land cultivated as well. Thus, one can conclude that sugar continues to be an important commodity in the Mauritian economy.

The overall relevance of sugar can be supported through its continued inflated export earnings for raw sugar via preferential trade agreements. The sugar sector is engaged in preferential trade agreements, or rather preferential pricing agreements (quotas at a specified price), with both the European Union and the United States. In the case of the EU, Mauritius is currently a signatory of the Cotonou Agreement that was established in June 2000. This agreement merely extends the trade preferences that were present under the Lomé Convention IV (1990-2000), of which Mauritius was a signatory as well. Preferences were extended for eight more years, until January 1, 2008.[6]

[6] ECDPM, http://oneworld.org/ecdpm/en/cotonou/13_gb.htm, accessed November 15, 2001.

But, the importance of the extension rests in the sugar sector being assigned a quota through the Sugar Protocol of the Lomé Convention that ensures an inflated price for its sugar exports. In 1975, the European Community and 46 African, Caribbean and Pacific (ACP) countries signed the Lomé Convention. The Lomé Convention had a special provision for sugar called the Sugar Protocol which was annexed to the Lomé Convention in 1975. The Sugar Protocol is an agreement where the European Union (EU), at a specified price, would buy the agreed upon quota amount from a set of African, Caribbean and Pacific (ACP) countries. Sugar exports, as defined by the Sugar Protocol, have received as much as 4.6 times the world price since its inception.[7]

In addition to the Sugar Protocol causing Mauritius to receive prices for its sugar exports well above the world price, the Special Preferential Sugar (SPS) Agreement is an additional agreement between ACP countries and the EU. It was finalized June 1995. The price for sugar covered under this agreement is calculated by subtracting 8.1 euros (€) per 100 kilograms from the ACP guaranteed price for raw sugar in the Sugar Protocol.[8] This too would equate to the sugar sector gleaning a price higher than the world price and is dependent on the overall difference in Sugar Protocol's pricing versus the world price. On average, the sugar exports flowing to the EU are 89.5% of the total sugar exports from 1974-2003. As a result of such a trade agreement, by the 2003/2004 fiscal year (FY 2003/04), 94.8% of total sugar exports flowed into the EU.[9]

On the other hand, most of the residual sugar exported from Mauritius also receives an inflated price through the United States. In particular, the Mauritian

[7] World Bank, 1989, p. 8.
[8] ACP Sugar Group, http://www.acpsugar.org/protocols.htm, accessed March 24, 2003.
[9] Author's calculations from the Bank of Mauritius, Annual Report, Various Years.

government receives preferential pricing of sugar through the Tariff-Rate Quota (TRQ) established with the United States.[10] From 1990, Mauritius is assigned a raw sugar, short ton quota of 20,200. The quota had grown to 26,754 by 1996 and then decreased gradually from 1998 to 2002 to a quota of 12,636 raw sugar, short tons.[11] But, the United States, from 1985-2000, pays a raw sugar price as high as eight cents per pound above the world price. From 1990-1999, the price is consistently 2-3 times the world price. From 2000-2003, the sugar prices for the U.S. are 2.6, 2.4, 3.4 and 3.1 times the world price respectively.[12] And, because of the inflated price garnered from selling in the U.S. under this quota, the United States has absorbed the majority of the residual sugar exports, such that the U.S. and the EU comprise no less than 95.3% of total sugar exports for Mauritius from 1990-2003.[13] Thus, sugar exports have gleaned inflated export earnings because the price it receives for the vast majority of its exports currently is at least two to three times the world price for sugar.

As a result of such favorable trade conditions for Mauritius' sugar exports, the commodity still comprises 6.16% of GDP in 2001 (at 1992 constant prices), export revenues of 8,775 million rupees (Rs million) in FY 2003/04 (which equates to a 20.8 % of total domestic exports for that year) from sugar alone, and 62.8% hectare usage of total

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[10] World Trade Organization, 1995, http://www.wto.org/english/tratop_e/tp15_e.htm, accessed November 2, 2001.

[11] Data comes from the United States Department of Agriculture, "The Sugar and Sweetner: Situation and Outlook Report," January 2001, pg. 58-59 for the U.S.'s FY 1996-1998. But, FY 1999-2001 is from http://ers.usda.gov/publications/so/SOOheader.asp?f=specialty/sss-bb/, accessed September 12, 2005. For the FY 2001-2004, the tariff-rate quota comes from http://ers.usda.gov/publications/so/SOOheader.asp?f=specialty/sss-bb/, accessed September 12, 2005.

[12] Author's calculations from the United States Department of Agriculture sugar price for raw sugar on the New York Stock Exchange. The world price for raw sugar is contract No. 11 freight on board (f.o.b.) stowed Caribbean port, including Brazil, bulk spot price. And, the U.S. price for raw sugar is Contract No. 14, duty fee paid New York.

[13] Author's calculations from the Bank of Mauritius, Annual Reports, Various Years.

cultivatable land in 2004.[14] Thus, sugar is still an important commodity in the Mauritian economy.

1.1.2 Protectionist Stance of Mauritius

Mauritius is a country that has and does yet heavily rely on tariffs as a source of revenue. First, the comparison of Mauritius' unweighted tariff rates with the rest of the world shows how it is, on average, more protectionist than most countries. Secondly, review of the government revenue data shows that Mauritius currently does still heavily rely on import tariffs as a source of revenues. Lastly, several organizations explicitly label Mauritius as a highly protectionist economy. Thus, Mauritius is considered a protectionist economy having a substantial portion of its government revenues comprised of import tariffs.

In comparison to other countries, Mauritius' average tariff rate movement would support that it is highly protectionist. The average tariff rate of Mauritius outpaces developing as well as industrialized countries' average tariff rates (where only two country delineations exist, developing and industrialized). Table 1 reports the trend in the unweighted average tariff rates of Mauritius versus all developing and industrialized countries for 1981-1998. It is as follows:

[14] The sugar revenue to GDP came from an e-mail correspondence with the Central Statistics Office. The total export revenues and subsequent percentage of total domestic exports came from Bank of Mauritius, Annual Report 2003-2004. And, the hectare usage came from the Author's calculations based on data from FAOSTAT data, 2005 (total cultivable land usage for 1961-2002), PROSI Magazine (total land under cane cultivation 1961-1998), and the Digest of Statistics 2003 and 2004 (total land under cane cultivation 1999-2004).

Table 1: Trends in Average Tariff Rates for Mauritius, Developing, and Industrial Countries 1981-1998 (Unweighted Average, Percentage)[15]

	Mauritius	Developing Countries	Industrial Countries
1981	34.9	23.1	n.a.
1984	35.8	29.7	8.5
1985	37.9	27.2	n.a.
1986	41.7	26.6	6.0
1987	39.5	24.7	n.a.
1989	27.6	23.8	8.2
1994	29.0	18.7	7.2
1995	29.0	16.1	6.3
1996	28.9	14.9	5.3
1997	29.1	13.7	5.0
1998	19.0	13.1	4.4

The years reported are the years of available tariff data for Mauritius.
n.a. is the notation for 'not available.'

It is evident that Mauritius' numbers are higher every year than in the developing and industrialized countries for those same years.[16] The disparity is as large as 15.4 percentage points in comparison to developing countries in 1997 and as high as 35.7 percentage points as compared to industrialized countries.[17] And, the average tariff rate on all goods for Mauritius from 1993-1999 is 27.0%, far exceeding its Sub-Saharan African counterparts' rate of 16.5% for the same period.[18] Hence, tariff rates in Mauritius are higher, on average, than most developing and industrialized countries, on average.

Furthermore, support of the protectionist stance taken by Mauritius in international trade is demonstrated in its heavy continued dependence on import tariffs

[15] Hoekman, Mattoo, and English, 2002, pp. 564, 567.
[16] Please note that not all countries had tariff rates calculated for every year, so that the average is the average of all available countries under the developing/industrial countries heading in any given year.
[17] Author's calculations.
[18] Author's calculations from Hoekman, Mattoo, and English, 2002, pp. 564, 570. Please note that Mauritius' data is reported through 1998, while the rest of Sub-Saharan Africa's data goes through 1999.

for revenue. Using the total share of each tax instruments receipts of total tax revenues for all available years from 1972-2004, the ranking of the taxes by order of importance is as follows: the import duties, sales tax/value-added tax, income tax, excise tax and the corporate tax rates with revenue shares of 31.1%, 16.8%, 14.4%, 10.9%, and 8.2% respectively from 1972-2004.[19] The next closest tax revenue earner is 14.3 percentage points away from the import duties share of revenue, on average. Therefore, although there are several relevant tax instruments used in the Mauritian economy, import duties are historically and currently the dominant tax instrument of choice for revenue generation.[20]

As a result, Mauritius is labeled as highly protectionist by various organizations. The World Trade Organization (WTO) in 2001 states that Mauritius faces challenges, one of which was that Mauritian companies producing for the domestic market are fairly protected and that its border protection remains high in some areas.[21] The Heritage Foundation publishes the Index of Economic Freedom where it ranks countries on economic freedom. Using the weighted average tariff rate (weighted by imports from the countries' trading partners), Mauritius has consistently received a score of four or five,

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[19] Author's calculations from the Bank of Mauritius Annual Reports, Various Years. The sales tax is coupled with the value-added tax because the sales tax of 8% was replaced in 1998 with the value-added tax of 10%. Please note, the average for corporate taxes is from 1992-2004 and the sales tax/value-added tax is from 1982-2004.

[20] Mauritius uses various tax instruments. As of 2004, the instruments used are income tax, corporate tax, social security, taxes on properties, capital and financial transactions, import duties, value-added tax, tax on gambling, taxes on hotels and restaurants, tax on use of goods and excise duties. In the Bank of Mauritius Annual Reports, 2003-2004, each of these tax instruments was estimated for the 2004-2005 year and was still in existence in the budget in the projected year. Direct taxes used in the economy are income tax, corporate tax, social security, and taxes on properties, capital and financial transactions. Indirect taxes employed by Mauritius are as follows: import duties, value-added tax, tax on gambling, taxes on hotels and restaurants, tax on use of goods, stamp duty, and excise duties. This information can be found in the Bank of Mauritius Annual Reports - Various Years.

[21] World Trade Organization, 2001, http://www.wto.org/english/tratop_e/tpr_e/tp176_e.htm, accessed October 7, 2002.

which correspond to a weighted average tariff rate greater than 14 percent but less than or equal to 19 percent and a weighted average tariff rate greater than 19 percent, respectively, since Mauritius was first assessed by the organization in 1999. What the scores reflect is that from 1999-2002 Mauritius is labeled as having a high level of protectionism. However, from 2003-2005, Mauritius is labeled as having a very high level of protectionism, actually increasing its weighted average tariff rate (from a range of 14%-19% to a range that exceeds 19%).[22] Thus, with an average tariff rate that exceeds the average developing and industrialized countries' tariff rates, tariff revenues comprising the largest share of its total revenues, and key economic organizations stressing the country's protectionist policies, it can be asserted that Mauritius is a highly protected economy.

1.2 THREATS TO THE CURRENT POLICIES – THE CHANGING LANDSCAPE

With the changing global trade environment, the status quo of both preferential sugar pricing by the European Union and the United States and high trade barriers within Mauritius are threatened. The Sugar Protocol, Special Preferential Sugar, and Tariff-Rate Quota have been challenged both internally and externally for both the EU and the U.S.

[22] The time series of the trade policy scores comes from the Index of Economic Freedom, Various Years, http://www.heritage.org/research/features/index/downloads/PastScores.xls, accessed September 20, 2005. The methodology for trade policy scores applied to the countries studied by the Heritage Foundation can be found for 2001 at http://www.heritage.org/research/features/index/features/index/ChapterPDFs/2001/Chap4.pdf, accessed September 20, 2005. The same scale is reported in 2002 at http://www.heritage.org/research/features/index/ChapterPDFs/2002/chap5.pdf, accessed September 20, 2005. Finally, the same scale is also reported in 2005 at http://www.heritage.org/research/features/index/chapters/Chapter_5.pdf, accessed September 20, 2005.

Likewise, the external and internal consensus shows a push for reciprocal, non-discriminatory free trade liberalization to occur in Mauritius as well. Thus, Mauritius faces two substantial reforms in the near future that can have economy-wide effects through linkages of the Sugar Milling sector with the other sectors in the economy and the considerable loss of government revenues from tariff removal.

1.2.1 Threats to Sugar

The sugar sector is facing a considerable blow in that the preferential agreements to which it is privy may be dissolved. The internal and external pressure for EU and the U.S. to reform their sugar regimes are evident. However, the reforms of the European Union and the United States' sugar regimes have implications for the Mauritian economy, in that the preferential pricing of sugar could erode welfare in Mauritius with a repeal of said policy in each country.

1.2.1.1 The EU Sugar Regime Change

One implication is that the sugar trade is not likely to retain its current price structure is displayed by the European Union. The EU, the key importer of Mauritian sugar through the Sugar Protocol and Special Preferential Sugar agreements, is facing internal and external pressure to change its trade policy. For example, the European Commission (EC) published a Green Paper on the relations between EU and ACP countries in November 1996. Forwood (2001) states how the publication shows a preference for the establishment of a series of several regional groupings of ACP countries (differentiated reciprocity in Regional Economic Partnership Agreements

(REPAs)) as opposed to maintaining its status quo preferential trade, extending the current benefits to all less-developed countries (LDCs), or establishing a free trade agreement with the ACP countries.[23] Lister (1998) study echoes the same sentiment, in that of the four options listed in the Green Paper, the most heavily discussed option is breaking the then Lomé Convention agreement into a set of smaller regional agreements, arguing that the depth of its discussion in the Green Paper shows the European Community's preference for that option over the other three possible options for EU-ACP relations.[24] Thus, there is growing dissention internally in the European Union over continuance of its preferential trade agreements and support of policy that focuses on the establishment of regional trade agreements instead.

Pursuit of a lower European Union budget can also exert downward pressure on sugar pricing, providing an impetus for the removal of the preferential pricing agreement as well. Morgan (2001) discusses the internal pressure for the European Union to remove the preferential agreement through a need to decrease the EU budget. The author describes how internal countries seek for ways to reduce the EU budget to which they contribute and one obvious way to do this is to cut its expenditures. And, at least politically so, it is easier to reduce spending overseas than internally where recipients are not voters.[25] Of course a clear target is the preferential trade agreement. As stated earlier, the region absorbs 94.8% of Mauritius' sugar exports by the FY 2003/04.[26] Please note, the European Union has been a net exporter of sugar from 1995-1999, with production exceeding consumption in each year. This implies that in recent years, the

[23] Forwood, 2001, p. 427.
[24] Lister, 1998, p. 384.
[25] Dabee and Greenaway, 2001, p. 180.
[26] Author's calculation from the Bank of Mauritius, Annual Report, 2003-2004, p. 21.

Sugar Protocol imports from the ACP were not needed to meet domestic demand at all, and yet they were still imported into the EU region.[27] Thus, the EU may be more likely to embrace a change in the current trade arrangement in sugar with all of its current ACP trade partners to reduce budget expenditures.

Furthermore, the internal support to remove preferential pricing of sugar are reflected through the European Community further analyzing the options for the future of the EU sugar regime to ensure its long-term viability through falling domestic sugar prices. In September 2003, an EC staff paper presented four options for the future of the EU sugar regime: the status quo, fixed quotas, fall in price, and liberalization. The 'fall in price option' is one where the ACP sugar price (because of EU sugar price reductions of 15-20%) would fall to €435 per tonne (metric ton) in phase 1 and in phase 2, the EC domestic price would fall to €450 per tonne, calling for the ACP sugar price to fall to €290 per tonne since the ACP Sugar Protocol prices are determined by domestic prices. By 2013, the reforms are to be in place.[28] Thus, because of the proposed reform, the downward pressure on EU domestic sugar toward world prices will cause the ACP preferential sugar price to tend to the world price.

This downward pressure on the ACP sugar prices due to sugar regime reform in the EU is also exhibited in an Agritrade publication. In the "Agritrade News Update," the reforms of the Common Agricultural Policy (CAP) in the European Union will lead to a fall in the sugar reference price (price that will determine the minimum price paid to beet producers, sets the guaranteed prices for preferential sugar imports, determines the level for import tariffs, and sets the trigger level for the new private storage safety net)

[27] European Union Sugar Statistics, www.acpsugar.org/stateu.htm, accessed November 2, 2001.
[28] Agritrade, January 2004, http://agritrade.cta.int/sugar/executive_brief.htm, accessed September 12, 2005.

from €632 per tonne to €422 per tonne. The price decline would span over three years, from 2005/2006 to 2007/2008. It has been stated that the current ACP quota would be retained. However, since the price offered to ACP suppliers will be tied to the reference price (as it is currently determined by the EU market price for sugar), the raw-sugar price will become €329 per tonne falling from €523.7 per tonne.

In the same publication, the repeal of the maximum supply needs (MSN) ceiling is being repealed. This change will directly impact the Special Preferential Sugar arrangement, where the residual amount of sugar it accounted for will be abolished (which amounted to about 290,000 tonnes in 2004).[29] Since Mauritius is the largest beneficiary of the Sugar Protocol quota as well as the Special Preferential Sugar arrangement with an assigned 491,031 and 82,000 tonnes respectively, it will have the largest losses due to the declining price and abolishment of the SPS agreement. It would lose 37.2% of its export price per tonne due to the first decrease in price slated for FY 2005/06 and 14.3% of its total sugar exports will lose their inflated price (SPS receives 85% of the Sugar Protocol price) due to the EU's repeal of the Special Preferential Sugar agreement.[30]

The latest update declares a 39% fall in prices will occur over two years beginning in 2006/07, with no review clause until 2014/15; compensating EU farmers for 60% of the price cut through a decoupled payment; a voluntary restructuring scheme lasting four years to transition less competitive producers out of the sector; the abolition of intervention; and assistance to ACP countries starting in 2006, with long-term

[29] Agritrade, http://agritrade.cta.int/alert040727-sugar.htm, accessed September 8, 2005.
[30] Agritrade, http://agritrade.cta.int/alert040727-sugar.htm, accessed September 8, 2005. Author's calculations based on the total export price adjustment quoted in the article.

assistance from 2007-2013.[31] Thus, one can see the erosion of preferential pricing in the sugar sector as a result of the reforms to the existing EU sugar regime structure as given through the Agritrade publication.

Externally, the European Union is also under direct pressure to reform its sugar regime through the WTO in a two-fold manner, each of which will cause decreases in price for African, Caribbean, and Pacific producers under the Sugar Protocol. First, the World Trade Organization impacts the Sugar Protocol and Special Preferential Sugar agreements through it being a venue in which the sugar regime in the European Union being challenged by other sugar producers. In February 2004, Australia, Thailand and Brazil challenged the EU under the WTO regime. The World Trade Organization ruled that the EU illegally subsidizes exports of sugar by not including the 1.6 million tonnes of output from ACP countries and India that are re-exported with subsidies within its agreed quota limits for subsidized sugar, thereby exceeding its subsidy limitation. Thus, it is required to reduce, by 1.6 million tonnes, the volume of subsidized sugar exported. As a result, by July 14, 2004, the European Commission presented a sugar regime reform that was to decrease the EU domestic sugar prices by about third and remove the existing quota system by the 2008-2009 fiscal year.[32] Hence, there is WTO pressure to decrease the subsidies to exports, which forces the domestic sugar price to fall, thereby causing decreases the sugar price garnered by the ACPs.

The second threat to the current preferential pricing policy being maintained is the WTO's general trade policy and power over newly forged agreements. In terms of general trade policy, there are a few things to note. First, the WTO rules apply across all

[31] http://europa.eu.int/comm/agriculture/capreform/sugar/index_en.htm, accessed September 12, 2005.
[32] ACP Sugar Group, http://www.acpsugar.org/Recent%20developments.html, accessed August 2, 2005.

members, containing a specific set of legal obligations that regulate trade policies of member states. Second, non-discrimination is expected of its members – that a product made in one member country is not treated any less favorably than that comparable product in another member country (i.e. a 5% tariff applied to one member's products must be applied to all members' products). In addition to universality and non-discrimination, WTO compliance calls for reciprocity of trade. The reciprocity entails the removal of domestic trade barriers quid pro quo for a reduction in foreign trade barriers.[33]

Given these attributes, the WTO directly impacts the Sugar Protocol present in the now ratified Cotonou Agreement in several ways. In 1997, the WTO recommended that the EU improve its own market access to least less developed countries (LLDCs) products under the Generalized System of Preferences Scheme. As of 1998, the EU began offering level access of Lomé to all LLDC's.[34] But, for Cotonou signatories, by 2004, all middle-income countries are to negotiate Economic Partnership Agreements (EPAs), regional trade agreements based on reciprocal trade, where all new trading arrangements are entered in force by January 1, 2008.[35] To date, the ACP countries are negotiating their Economic Partnership Agreements that will establish reciprocal free trade agreements across six ACP sub-regions. All EPAs are to be established by December 2007, with all Cotonou trade regime ending in 2008. The new EPAs are to be implemented from 2008-2020, which is considered a transitional period. After that, full

[33] Hoekman, Mattoo, and English, 2002, pp. 41-43.
[34] World Trade Organization, 2001, http://www.wto.org/english/tratop_e/tpr_e/tp65_e.htm, accessed November 2, 2001.
[35] Brown, 2000, p. 379 and http://europa.eu.int/comm/development/body/cotonou/overview_en.htm, accessed August 2, 2005.

implementation of the FTA is to occur.[36] Thus, there is a push for reciprocal free trade agreements by the WTO.

All in all, the preferential pricing of sugar is threatened because the current European Union sugar regime reforms have been discussed and even put in place to decrease total sugar prices (domestic and hence, Sugar Protocol sugar), that the EU no longer needs its sugar exports in the volume that the Sugar Protocol dictates, has a lack of justification to retain such expenditures, and because of increased compliance with World Trade Organization to establish reciprocal free trade areas.

1.2.1.2 The U.S. Sugar Regime Change

The United States, another region that absorbs sugar exports originating in Mauritius for an inflated price, is under internal and external pressure to change its current sugar policy as well. The internal pressure to dissolve its preferential agreement can be seen through a study by the General Accounting Office in June 2000. It signifies the problems with the current sugar program in the United States is that there are net economic losses from transfers to foreign producers given the artificially high price for raw sugar imports of which Mauritius is a recipient (tariff-rate quota). The net gain to the U.S. economy if the sugar program (TRQ program) was eliminated is found to be $930 million dollars.[37] Thus, the U.S. may decrease its tariff-rate quota to zero and hence Mauritius will lose its inflated price of sugar flowing to the U.S., to capture the calculated net gain to the U.S. economy.

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[36] ECDPM, March 2005, http://www.ecdpm.org/Web_ECDPM/Web/Content/Navigation.nsf/index2?ReadForm, accessed September 22, 2005.
[37] U.S. General Accounting Office, June 2000, pp. 12-14, 26.

External pressure stems from both the World Trade Organization and the North American Free Trade Agreement (NAFTA).[38] WTO is one external source of pressure because the non-discriminatory and reciprocal trade policies that the WTO supports are an issue in this case as well (not all nations have the TRQ extended to them and it is currently non-reciprocal) as discussed in the previous section. Thus, increased compliance with WTO would call for a reform of the current sugar program to be more inclusive with its policy, extending the benefit to all nations, or, making the agreement reciprocal.

The North American Free Trade Agreement is exerting external pressure to amend the sugar quota system in the U.S. as well. However, the agreement, considering it ties the United States to Mexico, supports the entry of Mexican sugar into the U.S. LMC International (2000) states that the combination of the internal pressure in the U.S., from the WTO agreement and the NAFTA agreement has already reduced the value of Mauritius' access to the U.S. market:

> "Pressure for change comes from three angles: from within the US, from the WTO agreement and from the NAFTA agreement (which has promoted the entry of Mexican sugar into the US market). The most important is the combined impact of NAFTA and the US's commitments to the WTO, and threatens to limit Mauritius' access, at most, its minimum guaranteed amount."[39]

If the trend continues, the regional free trade agreement (NAFTA) member may override the preferential agreement with U.S. sugar suppliers elsewhere, which includes Mauritius. Hence, it is possible that the United States will remove its preferential pricing scheme for sugar due to the producer discontent with rents gleaned from the quota system in the U.S.

[38] LMC International, August 2000, p. 8.
[39] LMC International, August 2000, p. 8.

sugar market from foreigners, World Trade Organization compliance, and the North American Free Trade Agreement members' appeasement.

Now the change and the potential change in the trade horizon will be discussed.

1.2.2 Threat to Protectionism

There are numerous reasons as to why the protectionist trade regime is likely to become more liberal and this change will have substantial economy-wide effects. One major reason is that all of the current trade agreements in which Mauritius engages establish reciprocal, non-discriminatory trade with its key trade partners now or in the near future. Another reason for potential change in tariffs in Mauritius is the proposed policy adoptions of the International Monetary Fund and its membership to the World Trade Organization. Lastly, there is an internal emphasis in Mauritius to lower its tariffs in coming years. Thus, the protectionist Mauritius may engage in partial or complete tariff liberalization.

First, a factor that increases the likelihood that trade policy will change for Mauritius in the future is that all recent trade agreements establish non-discriminatory free trade areas or have them as an objective to be implemented in the future. One trade agreement in which Mauritius is a part is the Southern African Development Community (SADC). It signed the trade protocol where member States are to eliminate customs duties and non-tariff barriers by 2006 against all member States.[40] The implementation date was later adjusted to where a free trade area would be created in which substantially

[40] Jenkins, Leape, and Thomas, 2000, pp. 5-6.

all trade will be duty free by 2008.[41] There are 14 members in this trade agreement: Angola, Botswana, Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe.[42] Four of the five total SACU members are included in this free trade area and the Southern African Customs Union has an average share of 9.9% of total trade imports in the 1970s, 8.8% in the 1980s, 11.8% in the 1990s, and 13.3% in the 2000s. In fact, the Southern African Customs Union is listed as one of the top three import regions of origin for Mauritius from 1969-2003 in 34 of a total of 35 years of available data. Therefore, Mauritius could embark on a FTA with the Southern African Development Community by 2008, causing economy-wide effects due to the volume of imports flowing from the Southern African Customs Union in particular.

On the horizon, Mauritius is also considering joining a US-SACU Free Trade Area, for which began negotiations began in June 2003.[43] Therefore, this would potentially cause a flow of tariff-liberalized trade amongst Mauritius, SACU (Botswana, Lesotho, Namibia, South Africa, and Swaziland) and the United States. The relevance here is two-fold. One is that the United States and the Southern African Customs Union comprise 14.0% of total imports flowing into Mauritius, on average, from 1969-2003, with an average of 16.3% of total imports in the 2000s. Thus, a US-SACU FTA is a trade policy change in Mauritius that could significantly impact the welfare of the country because it impacts a large portion of the total imports in the economy.

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[41] Bank of Mauritius, Annual Report 2002-2003, p. 85.
[42] Bank of Mauritius, Annual Report 1999-2000, http://bom.intnet.mu/AnnualRep2000/RegCop.htm, accessed December 3, 2001.
[43] Bank of Mauritius, Annual Report, 2002-2003, p. 28.

Also, Mauritius is a member of the Common Market for Eastern and Southern Africa (COMESA) which also establishes a FTA with key importers. It ratified that by October 31, 2000, all member countries are to eliminate tariffs on goods produced in member States, while applying its own set of tariffs to non-members.[44] And, by 2003, nine of 20 current members have reduced tariffs on goods traded (Mauritius is one of them).[45] Burundi and Rwanda then eliminated tariffs in 2004, such that eleven total countries complied with the free trade agreement.[46] However, by 2004, the establishment of a customs union (application of a common external tariff (CET)) was to ensue. This has not yet been implemented. COMESA's members are Angola, Burundi, Comoros, Democratic Republic of Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Namibia, Rwanda, Seychelles, Sudan, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.[47] Two of the five SACU members are included in this free trade area. Even though the Southern African Customs Union was listed as one of the top three exporters to Mauritius from 1969-2003 for 34 of the total 35 years of available data, the establishment of this FTA will have a lesser impact on tariff revenues because of the smaller trade volume countries are involved. But, a portion of total imports will be affected by the adoption of this agreement. Thus, the COMESA agreement, through the inclusion of key SACU members, can cause sizable changes to occur throughout the economy.

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[44] Murinde, 2001, pp. 18-19.
[45] COMESA, http://www.comesa.int/trade/tradbkgd.htm, accessed March 27, 2003.
[46] COMESA, http://www.comesa.int/trade/Folder.2005-09-06.3314/Part%20III%20The%20FTA/view, accessed September 22, 2005.
[47] Bank of Mauritius, http://bom.intnet.mu/AnnualRep2000/RegCop.htm, accessed December 3, 2001.

Another agreement that has called for a free trade area is the Indian Ocean Rim Association for Regional Cooperation (IOR-ARC) of which Mauritius is a member. It has a ratified plan to have each member State reduce its tariffs to zero for every other member State by 2020.[48] The members are as follows: Australia, Bangladesh, India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Mauritius, Mozambique, Oman, Seychelles, Singapore, South Africa, Sri Lanka, Tanzania, Thailand, United Arab Emirates, and Yemen Republic.[49] This agreement is discussed because one of the largest exporters and importers in the Southern African Customs Union, South Africa, is included here.[50] Therefore, the FTA with the IOR-ARC may have a considerable impact on tariff revenues since SACU imports 10.4% of total imports, on average, flowing to Mauritius from 1969-2003 and thus on overall welfare.[51]

The Cotonou Agreement with the European Union is just as straightforward.[52] As stated earlier, non-reciprocal trade was established through the Lomé Convention. These preferences were extended through the Cotonou Agreement. Although the Cotonou Agreement does not expire until 2020, the sustained trade preferences were scheduled to dissolve for middle-income countries and reciprocal trade preferences to begin in 2004.[53] And, since Mauritius is an upper middle-income country (as of 2004), there is a push for

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[48] Indian Ocean Rim Association for Regional Cooperation, http://www.dfa.gov.za/for-relations/multilateral/iorarc.htm, accessed March 27, 2003.
[49] Dabee and Reddy, 2000, p. 1154.
[50] When the United Nations stopped reporting the SACU separately as a line in Mauritius' imports and exports, it started reporting South Africa only (which is a considerable size of its own, being the number one importer to Mauritius from 2000-2004, the time in which it was reported separately). See the UN, International Trade Statistics Yearbook, 2000 and 2003.
[51] Author's calculations from data from the United Nations, International Trade Statistics Yearbook – Various Years.
[52] There are the EU-15 and 77 ACP countries that comprise the member States in the Cotonou Agreement. The relevance here is to simply note the FTA with the EU, so the countries will not be listed separately in this case.
[53] Brown, 2000, pp. 371, 379.

reciprocity in trade with Mauritius.[54] As previously stated, to date, the ACP countries are negotiating their Economic Partnership Agreements that will establish reciprocal free trade agreements across six ACP sub-regions, all EPAs are to be established by December 2007, with all Cotonou trade regime ending in 2008, the new EPAs are to be implemented from 2008-2020, and after that, full implementation of the FTA is to occur.[55] This move at the least signifies a change in trade relations with a region that exports comprises 30.1% of the total imports that flow into Mauritius from 1969-2003 on average.[56] Thus, when the trade preferences change under the EPAs, it can potentially have a substantial impact on welfare, given that as an option, Mauritius may enter a free trade agreement with the EU, a key importer in the Mauritian economy.

Internal pressure exists for Mauritius to change its current protectionist structure. An example internal pressure to change the trade structure is the Budget Speech of 1997 by the Minister of Finance. Dr. Bunwaree states that there is an urgent necessity to undertake major reforms in the indirect taxation systems. He also states the following, "It is the firm intention of the Government to restructure and lower customs tariffs in the coming years. It will also be a necessary to move toward the leveling of rates of excise on imported and domestic products."[57] Thus, there is a desire to change the current tariff structure internally, moving towards lessened tariff revenue reliance through decreased tariff rates.

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[54] Brown, 2000, p. 379.
[55] ECDPM, March 2005, http://www.ecdpm.org/Web_ECDPM/Web/Content/Navigation.nsf/index2?ReadForm, accessed September 22, 2005.
[56] Author's calculations from the United Nations, 1999, p. 627.
[57] Budget Speech, 1997, p. 42.

Externally, the International Monetary Fund recommends tariff liberalization for Mauritius, exerting pressure on Mauritius to further liberalize trade. In 1999, the IMF suggested a deeper tariff liberalization than what they observed in the 1999/00 fiscal year. They write,

> "Directors took note of the steps that have been taken in the context of the 1999/2000 government budget to liberalize the tariff regime. However, they favored a more ambitious move to lower tariff rates, in concert with higher value-added tax revenue collections and consistent with regional commitments, so as to foster external competitiveness and the expansion of employment."[58]

Similar sentiments are echoed in the 2000-2001 report as well. The IMF places an emphasis on import trade liberalization to increase productivity growth and ensure neutrality between the import-competing and export sectors. It states the following:

> "Directors emphasized that trade liberalization and the resulting exposure to foreign competition would be key to accelerating productivity growth. As export subsidization policies were constrained by WTO rules, there was a need for a pre-announced medium-term liberalization of the import regime-including the elimination of state trading-to ensure neutrality between the import-competing and exporting sectors."[59]

In 2002, the Board of Directors of the IMF encourage authorities to further liberalize trade and bring Mauritius fully in line with WTO specifications, which would suggest decreasing tariffs further and non-discriminatory, reciprocal trade.[60] In 2003, the Executive Directors of the IMF discuss further trade liberalization: "Directors commended the government for reducing tariff rates in the context of the regional trade agreements. They encouraged the authorities to simplify the customs tariff system over the medium term, and eliminate non-tariff barriers."[61] Lastly, in a 2004 Article IV

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[58] IMF, http://www.imf.org/external/np/sec/pn/1999/pn9978.htm, accessed April 28, 2002.
[59] IMF, http://www.imf.org/external/np/sec/pn/2001/pn0152.htm, accessed September 26, 2005.
[60] IMF, http://www.imf.org/external/np/sec/pn/2002/pn0271.htm, accessed September 26, 2005.
[61] IMF, http://www.imf.org/external/np/sec/pn/2003/pn0397.htm, accessed September 26, 2005.

Consultation with Mauritius, the Executive Directors of the IMF support trade liberalization via custom duties reductions in addition to the introduction of a medium-term tariff reform program which would lower the maximum and average tariff rates:

> "Directors welcomed the authorities' commitment to trade liberalization and supported the reduction of custom duties in the 2004/05 budget. At the same time, they urged the authorities to announce a medium-term tariff reform program, including a lowering of the maximum and average tariff rates."[62]

So, even fairly recently, the International Monetary Fund has continued its drive to lower tariffs in Mauritius. Thus, there is a consistent concerted effort to push for a more liberal tariff regime by the International Monetary Fund and, as a result, in adherence to IMF policy recommendations, Mauritius been moving to liberalize trade.

1.2.3 Why Are These Losses Relevant?

The inflated sugar export price and the non-uniform tariff rates are both distortionary. Given the theory of the second best, it has been presented that employing or removing one distortionary instrument while maintaining another has an ambiguous effect on the national welfare.[63] And, with distortionary taxes other than tariffs being used in the Mauritian economy as well (i.e. indirect taxes, value-added tax, excise tax, etc.), it is pertinent to quantify national welfare within a framework that allows one to capture economy-wide effects from one or both changes cited above. The loss of sugar revenues due to a loss of preferential prices (i.e. decrease in sugar export price to the world price) calls into question the total impact the sugar industry's loss will have on other industries to which it is closely tied. The tariff liberalization (decrease in tariffs or

[62] IMF, http://www.imf.org/external/np/sec/pn/2004/pn0498.htm, accessed September 26, 2005.
[63] See Markusen, Melvin, Kaempfer, and Maskus, 1995, pp. 142, 157.

removal of tariffs by region) is relevant due to the total amount of revenues that would have to be replaced from the liberalization and which tax instruments will be used to do so.[64] Hence, the changes are relevant based on the total impact the reforms could have on the economy as a whole.

1.2.3.1. Sugar Export Price Reduction and Its Implications

The anticipated loss of inflated sugar pricing would cause Mauritius to sell its sugar at the world price. This would cause a severe contraction of the sugar revenues. Agritrade (2004) outlines how the European Commission assessed the sugar sector regime for beneficiaries and its potential implementation of the 'fall in price' option in 2004. This 'fall in price' option was to decrease the price of ACP to €435 per tonne and then to €290 per tonne. Agritrade (2004) states that at a raw sugar price of €435 per tonne, of the 18 total countries engaged in the Sugar Protocol, the European Community expects the Democratic Republic of the Congo, Jamaica, and Madagascar would be likely to cease exporting to the EU. However, at the raw sugar price of €290 per tonne, Burkina Faso, Tanzania, Côte d'Ivoire, Mauritius, Congo Brazzaville, Guyana, Malawi, Senegal, Swaziland, Belize and Fiji, would cease to export to the European Union as well such that 14 of the 18 countries would stop exporting to the EU. And, since the largest income transfer flows to Mauritius, it will suffer the greatest income loss.[65] The sugar export price is quite relevant to Mauritius since on average 95.8% of total sugar production is exported and 89.5% of Mauritius' total sugar exports flow, on average, to the EU from

[64] Because of the sheer magnitude of import tariffs as a portion of total revenues, it seems more credible to have replacement of the lost revenues rather than a large change in government consumption.
[65] Agritrade, January 2004, http://agritrade.cta.int/sugar/executive_brief.htm, accessed September 12, 2005.

1974-2003.[66] Given that there are linkages that exist between the sugar industry, the effects of the loss of preferential sugar export prices on the output, exports, and import quantities of other sectors are unknown. And, given the continued relevance of the sugar sector, these effects can be substantial. Therefore, one may expect significant sectoral reverberations in the Mauritian economy through linkages of the sugar sector to other sectors in the economy.

1.2.3.2. Tariff Liberalization and Its Implications

Mauritius may also undergo continued tariff liberalization, even to the extent of establishing unilateral regional tariff liberalization with its key importers. Since it has been established that Mauritius has a heavy reliance on import tariffs for government revenue, the main implication of tariff liberalization is that the government would lose a key source of revenues. Next, is that what tax instrument are used to replace lost tariff revenues will matter, in that the rate changes of the replacement tax must be feasible. Not only the magnitude of tax rate changes of alternative taxation matter, but some taxes are less distortionary than others and may cause a national welfare gain due to its less distortionary nature. Also, it has been established in trade theory that tariffs will cause a resource pull in the economy with producers being drawn to an industry due to the inflated price they can obtain for their goods. All in all, full tariff liberalization will adjust the efficiency of the economy as a whole.

The government will lose a key source of revenues from removing tariffs. Import duties comprise an average of 33.2% of total tax revenues in 1972-1979, 30.5% of total tax revenues from 1980-1989, 32.3% of total tax revenues during the decade of the

[66] Author's calculations from Bank of Mauritius, Annual Reports-Various Years.

1990s, and 26.7% of total tax revenues from 2000-2004. And, on average, import duties comprise 31.1% of total tax revenues from 1972-2004 in Mauritius. In the fiscal year 2004-2005, import duties are still 24.4% of total tax revenues.[67] Thus, one can see if full tariff liberalization would occur, there would be a replacement of almost a quarter of total revenues in 2004, and, on average, 31.1% of total revenues would have to be replaced in any given year. Such a windfall of revenue would have to be replaced and it is not credible to believe that the other taxes will not be adjusted to account for the lost government revenue of that magnitude.[68]

With trade taxes being such a large portion of Mauritius total government revenue, it will matter what instrument is used to raise revenue lost from tariff liberalization, in that it must be politically feasible. Aristy-Escuder (1999) displays how, with revenue replacement, the tariff reduction would imply a considerable increase in corporate taxes (264.23% increase with full liberalization) for the Dominican Republic. However, he also puts forth how an increase in indirect tax rates and household income taxes is much more viable.[69] Cattaneo, Hinojosa-Ojeda, and Robinson (1999) calculate the change in the enterprise tax rate and the sales tax rate to compensate for tariff revenue replacement with full tariff liberalization in Costa Rica. They find that the enterprise tax rate has to reach 26%, or rather increase by 74% relative to its currently collected rate, and that the sales tax rate has to increase by 85% relative to is current rate of collection. Cattaneo, Hinojosa-Ojeda, and Robinson (1999) conclude that both policy options would

[67] Author's calculations from Recurrent Budget Revenues in the Bank of Mauritius, Annual Reports-Various Years.
[68] See Aristy-Escuder, 1999, p. 212, where tariffs were a sizable share of total revenues.
[69] Aristy-Escuder, 1999, p. 221.

appear to be difficult to implement.[70] Therefore, the viability of implementation of a tax rate increase to replace lost tariff revenues is relevant.

Not only is the magnitude of the tax rate increase for the revenue replacement important due to its political feasibility, but the efficiency of a tax matters as well. The relevance of the tax structure of Mauritius, in this case, is due to changing distortionary policy can impact the efficiency of the economy while other distortions exist. Taxes other than tariffs are being used as well (i.e. indirect tax, value-added tax, excise tax, etc.). Thus, it is pertinent to explain the various tax instruments, some of which can distort. These domestic distortions can even determine trade flows.[71] And, in a market where distortions already exist, welfare may increase or decrease with other distorting instruments being employed or removed. [72] For example, Morrisey (2001) states that replacing tariffs with a uniform value-added tax would decrease the economic inefficiencies in the Mauritian tax system by decreasing the price distortions associated with the tax system.[73] So, the implementation of uniform taxation may remove inefficiencies.

For the United States, Bizer and Steward (1987) present how the marginal efficiency cost for a change in the import fee is higher that the marginal efficiency cost for a change in the oil consumption tax. This is due to how that the oil import fee, as a protective tariff, taxes all domestic consumption, but rents are accrued by the owners of the protected good.[74] This finding suggests that tariffs carry a higher efficiency cost than a consumption tax, which will matter in economic efficiency. Harrison, Rutherford, and

[70] Cattaneo, Hinojosa-Ojeda, and Robinson, 1999, p. 59.
[71] Markusen, Melvin, Kaempfer and Maskus, 1995, p. 142.
[72] Markusen, Melvin, Kaempfer and Maskus, 1995, p. 157.
[73] Dabee and Greenaway, 2001, p. 148.
[74] Bizer and Stuart, 1987, p. 1020.

Tarr (2002), with the employment of a CGE model, find that the benefits of trade liberalization for Chile are reduced considerably if tariff revenue is replaced by a distortionary alternative tax.[75] Thus, what replacement tax chosen will adjust economic gains and hence, economic efficiency. Also, Wang and Zhai (1998) conclude in their study of China that the economic efficiency gains are dependent on which tax instrument the government chooses to replace tariff revenues (either the value-added tax, sales tax, corporate tax, income tax, or the lump-sum replacement tax), with the lump-sum tax producing the greatest efficiency gain.[76] Again, gains in the economy are dependent on what taxes are chosen for revenue replacement. In conclusion, the efficiency of a tax must be considered when replacing tariff revenue because it can affect the efficiency of an economy at large.

Given other distortions exist in the Mauritian economy, the tax instrument chosen matters for revenue generation. Therefore, the tax used to replace revenues is going to matter and Mauritius must be able to assess its ability to raise tax revenues from alternative sources. Since the source of revenue replacement is considered relevant, which revenues used for this study will be discussed. The taxes used for revenue replacement is the value-added tax and a non-distortionary lump-sum tax. The motivation is simple, the dominant revenue earners following the import tariff revenue, as given by their average share of total taxes, are the sales tax/value-added taxes, income taxes, excise taxes, and the corporate taxes for 1973-2004. The value-added tax is the only tax instrument that has experienced an increasing usage from the decade of the 1980s through the 2000s. The average total share of total tax revenue for the 1980s is

[75] Harrison, Rutherford, and Tarr, 2002, p. 52.
[76] Wang and Zhai, 1998, pp. 372, 374, 379.

7.5%, for the 1990s is 15.1%, and 35.0% for the 2000s. The value-added tax was implemented in 1998, and its revenues actually outpaces import duties average share of total tax revenues in the 2000s, where import duties average share of total tax revenue is 26.7%, whereas the average share for the value-added tax is 35.0% of total tax revenues.

Another motivation for using the value-added tax for revenue replacement rests in the IMF Article IV Consultation with Mauritius. The Executive Directors in 1998 urged Mauritius to effectively implement the value-added tax, where the value-added tax rate and its total coverage should be sufficient to replace other indirect taxes, compensate for planned lowering of tariff rates, and increase the tax revenue to GDP ratio. The text reads,

> "They noted that fiscal reforms would need to center on an effective implementation of a value-added tax (VAT), complemented by restraint on current expenditures. In that connection, the VAT rate and coverage should be sufficient to replace other indirect taxes; compensate for the planned lowering of tariff rates; and raise the tax revenue-to-GDP ratio…Directors encouraged the authorities to proceed with the rationalization of the tariff regime as soon as practicable after the full and effective implementation of the VAT."[77]

Therefore, the value-added tax is viewed as a preferred tax to replace lost tariff revenues and is considered sufficient enough to replace all other indirect taxes in the Mauritian economy. In 2004, the IMF discusses how the value-added tax should be extended to additional items, to foster reduction of the deficit, decreasing the public debt to a sustainable path and stabilizing the debt-to-GDP ratio.[78] Hence, the value-added tax will be used for revenue replacement because of its increasing usage that even exceeded the average share of total taxes for the import tariffs in the 2000s and the International

[77] IMF, http://www.imf.org/external/np/sec/pn/1998/pn9846.htm, accessed April 28, 2002.
[78] IMF, http://imf.org/external/np/sec/pn/2004/pn0498.htm, accessed September 26, 2005.

Monetary Fund's recommendation for more extensive use of the value-added tax in Mauritius.

What has been established is that import tariffs will cause a reallocation of resources in the economy. First, it must be noted that trade theory suggests that a distortion cost of a tariff increases more than proportionately with the size of the tariff because concurrently, the quantity of resources misallocated increases, acting multiplicatively on the tariff in calculating the value of the distortion costs.[79] Greenaway and Milner (1989) display, through the computation of effective protection for 1980, that in Mauritius there are attractive incentives to produce in one industry versus another purely as a consequence of the tariff structure. The example given was that twelve of the twenty-two industries in their study could double the value-added without being concerned with losing its competitiveness.[80] Hence, with the additional profits to accrue in protected sectors, there is a resource pull into sectors to which tariffs are attached.

Overall, one could expect that Mauritius would be concerned about lost income in the sugar sector from facing a decreasing preferential price or total sugar export price liberalization and the effects of extending duty-free access to the European Union, the Southern African Customs Union, the United States, and even the world. Mauritius may look to offset the contracting sugar sector's effects by adjusting other trade policies that they can control to counteract what cannot be controlled, the European Union and the United States' policies toward it. What rings true of the sugar and trade policy changes the country potentially faces or will face is the ambiguity of removing distortions while other distortions exist in the economy, whether or not it will increase welfare. With the

[79] Harrison, Rutherford, and Tarr, 1993, p. 205.
[80] Greenaway and Milner, 1989, pp. 1002-1003.

increased pressure for globalization, the Mauritian government might desire to quell the effects of losing its preferential pricing with other trade liberalizing policies, quantifying the economic effects of losing preferential pricing of sugar in isolation as well as with establishment of unilateral tariff liberalization with the European Union, Southern African Customs Union, the United States and the Southern African Customs Union jointly, and even with all of its trade partners simultaneously, such that they could assess what reform is most welfare-improving and what reform or set of reforms, if any, dominate.

1.3 CURRENT LITERATURE

In light of the proposed changes in the Mauritian economy, there is literature that lends itself to the necessity of a quantitative assessment of these policy changes. Since the changes are economy-wide, it is necessary to discuss the benefits of using a computable general equilibrium model to capture these reforms. First, the computable general equilibrium literature presents that the effects of a fall in export price have an ambiguous effect on national welfare. Second, computable general equilibrium studies support the ambiguity of the effects of tariff liberalization. Thus, the relevance of the Mauritian study as born by the current literature will be addressed here.

1.3.1 The Ambiguity of Export Price Liberalization Effects on Welfare

The ambiguity of export price liberalization on economies as a whole can be shown through several studies. Some studies present how export price liberalization can

cause little effect on an economy while others show it could have a large detrimental effect on the economy analyzed. Nielsen (2003) shows how those currently involved in preferential trade agreements can be hurt by the loss of preferences. Simulating a removal of preferential treatment for rice exports to the European Union (removal of tariff-rate quotas and tariff rebate agreements), severe trade diversion occurs in India and Pakistan (a decrease in the exports of paddy rice by 41.5% and 25.0% respectively), both of which enjoy preferential access to the EU through substantially lower applied tariff rates than the normal rate and in the absence of quantitative restrictions in the form of tariff-rate quotas. The contraction of exports of processed rice in India of 2.5% is severe enough such that it decreases production of processed rice by the same amount.[81] Since Mauritius is such a large beneficiary of the Sugar Protocol and the Special Preferential Sugar agreement, the erosion of sugar preferential export market in Mauritius could have sizable adverse effects on the Mauritian economy.[82]

Another instance in which export price decreases hurt an economy is given through Siriwardana (1995). In the study of Australia, one of the key external factors attributed to the recession in the 1930's is a fall in export prices and the subsequent contraction in export revenues for major export commodities (wheat and wool). Siriwardana (1995) finds that real income falls by 8.9%, real GDP decreases by 5.2%, and the terms of trade falls by 19.6%. The aggregate imports and exports decline sharply (28.2% and 22.9%, respectively). Also, the fall in export prices of the two key commodities in the economy caused a contraction in output across all sectors in the

[81] Nielsen, 2003, pp. 21, 23.
[82] The United States is not discussed here because of the direct reference to another preferential pricing agreement in the EU specifically.

economy. And, the aggregated export volumes contracted as well, with the largest amount being in the agricultural sector (14.6%).[83] Thus, the change in commodity prices can have a staggering, contractionary effect on an economy as a whole. If Mauritius' sugar sector has strong forward and backward linkages in the economy, removing the preferential price could have stifling economic effects as well.

On the other side of the coin, commodity price liberalization, may only largely affect the sector it involves directly, while only slightly changing the rest of the economy. Taylor, Yúnez-Naude, and Hampton (1999) present how maize-price liberalization in Mexico actually leads to sharp decrease in maize output, drives the shadow price of land and labor down only a fraction of the total staple's price change, while the output of livestock and non-agricultural production increases by 1.8% and 1.1% respectively.[84] And, clearly the redistribution of resources to higher marginal value sectors will cause an increase in national welfare. Therefore, the sugar export price adjustment in Mauritius may only have marginal economic waves across an economy or even a positive welfare effects depending on the reallocation of resources the change will create.

In conclusion, there is not any concrete evidence that the sugar sector's loss of preferential pricing will have a large or small welfare effect or even the effect it will have on other sectors. If resources are highly misallocated, production may increase enough to offset the contraction in the sugar industry, thereby increasing welfare. However, if the sugar sector is a place of comparative advantage, its lack of operation may be a large detriment to Mauritius. Therefore, sugar export price liberalization must be studied further.

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[83] Siriwardana, 1995, pp. 52-53, 72-73.
[84] Please refer to Taylor, Yúnez-Naude, and Hampton, 1999, pp. 453, 463-466.

1.3.2 The Ambiguity of Tariff Liberalization Effects on Welfare

This notion of tariff liberalization's ambiguous effects on welfare can be further displayed through the CGE models producing both positive and negative welfare effects. Within the computable general equilibrium context, there are authors that have found positive welfare effects attached to trade liberalization. Ábrego (1999) states that for El Salvador in 1990, the economic policy reformers felt that the economic performance seen in the country from 1989-1999 is due to trade reform. And, the finding of his study shows that welfare and income levels improve with trade liberalization.[85] Breuss and Tesche (1994) describe, in their linked computable general equilibrium study of trade liberalization in Austria and Hungary, how trade liberalization (unilateral and bilateral tariff removal) improves the national welfare of both countries.[86] Hosoe (2001), in a CGE model for Jordan, shows that a free trade agreement with the European Union will improve Jordan's welfare by 0.28% (relative size to the base run GDP).[87] Hence, trade liberalization can increase welfare in a country.

Some researchers' results support that tariff liberalization is detrimental to the national welfare of an economy. Harrison, Rutherford, and Tarr (2002) study the effects of Chile joining regional trade agreements additively. In their study, they find that a free trade area with MERCOSUR (Argentina, Brazil, Paraguay and Uruguay), regardless of the elasticities used, causes welfare decreases across each tax replacement scenarios. And, in the simulation run where Chile decreases its tariffs to zero for the North American Free Trade Agreement members, but did not gain any improved access to the

[85] Ábrego, 1999, pp. 72, 77-79.
[86] Breuss and Tesche, 1994, pp. 534, 538, 541, 547.
[87] Hosoe, 2001, pp. 597, 599.

NAFTA members' markets (i.e. without reciprocal access to NAFTA markets), the national welfare for Chile decreases for all elasticities and tax replacement scenarios. This simulation case actually produces the largest decreases in welfare across all tax replacement scenarios than any other case considered in the study.[88] Hence, it is established that trade liberalization needn't increase national welfare, but can actually cause it to contract, especially with unilateral, non-reciprocal liberalization.[89]

Another example of tariff liberalization causing negative welfare effects can be found in the study performed by Salehezadeh and Henneberry (2002). They report that partial trade liberalization (biased against agriculture) shows no clear indication of economic growth and improvement of income distribution occurs at all. In fact, they find the economy suffers decreased welfare due to the liberalization.[90] Thus, if a country only desires to liberalize some, not all of its sectors, it could have a contractionary effect on national welfare. All in all, it is unclear what full tariff liberalization will do to the national welfare of Mauritius and needs further analysis.

To date, this has not been done for the Mauritian economy. There is currently one unpublished paper that presents a CGE for the country of Mauritius, assessing a sugar price shock on the economy. Blake, Milner, Reed, and Westaway (1995) used a two-sector model to show the effects of a price shock for sugar on traded and non-traded sectors in the model. They create a social-accounting matrix for Mauritius in 1987. In the three-sector case they model the rise in the price of all exports. In the three-sector case, the sugar sector expands at the expense of the Export Processing Zone

[88] Harrison, Rutherford, and Tarr, 2002, pp. 50, 58.
[89] This study does not perform the tariff liberalization with increased access to export regions of destination. However, increased access to other markets can be modeled by an increase in Mauritius' export prices for goods flowing to a particular region (i.e. a 1% gain in export price).
[90] Salehezadeh and Henneberry, 2002, pp. 484-485.

Manufacturing sector while factor prices and non-tradable prices increase.[91] However, it does not capture the reforms presented here concurrently. Thus, I will add to the literature in three ways. First, I will present an 11-sector CGE model for the country of Mauritius for 1997. Second, I will add to the literature by quantifying the effects of the sugar export price decreasing by 59% for the European Union, 45% for the United States, and jointly on the economy. Third, I will also add to the literature by analyzing the various sugar and tariff reforms concurrently to present the most welfare-improving scenarios.

In conclusion, Mauritius may find it profitable to quantify the effects of the removal of the preferential pricing of sugar, unilateral tariff liberalization with the European Union, the Southern African Customs Union, the United States and the Southern African Customs Union, and with all of its trade constituents, with revenue replacement by the value-added tax and a lump-sum tax. In other words, this study can test Mauritius' trade policy effectiveness in increasing welfare in light of sugar export price liberalization. Quantifying the effects listed above is exactly what this study will do.

1.4 FOCUS OF THE STUDY

Since Mauritius will inevitably lose its preferential pricing for sugar and can possibly counteract any negative welfare effects with either the adoption of unilateral free trade with the European Union, the Southern African Customs Union, the United States

[91] Dabee and Greenaway, 2001, p. 174.

and the Southern African Customs Union jointly, and with all of its trade partners, I will employ an 11 sector computable general equilibrium model of the economy to show the effects of a decrease in sugar price to the world price in isolation and with trade liberalization for the value-added and lump-sum tax replacement. As a result, this dissertation seeks to quantify the welfare effects of the potential sugar and tariff policy changes that Mauritius faces with revenue replacement by the distortionary value-added tax or the distortionless lump-sum tax.

The Supply and Use Table for 1997 is available, and thus I create the 1997 Input-Output Table, the basis for the computable general equilibrium model.[92] I update the tariff rates and introduce the value-added tax to reflect the changes in the tax structure of the economy from 1997-2000 and this provides the base for which all simulations are run. The distortionary value-added tax and the non-distortionary lump-sum tax will be allowed to vary endogenously to satisfy a real government revenue target. I will consider the changes from sugar export price reform (i.e. removal of the preferential price by the European Union, by the United States, and full sugar export price liberalization) in Mauritius in isolation and then simultaneously with the unilateral tariff liberalization by region(s) to capture the interactive effects of sugar and tariff reform, with revenue replacement. This will allow me to explain the effects sugar reform for the EU and the U.S. in isolation and together, as well as the sugar export price changes and trade policy reforms respectively to shed further light on the effects of chosen trade policy instruments, when combined with sugar export price decreases, that may increase

[92] The Input-Output Table for Mauritius became available from the Government of Mauritius in 2005. But, the computed 1997 Input-Output Table is what is utilized in this study.

welfare. More specifically, I will quantify the welfare effects of the following policy changes:

1. What are the welfare effect of the following sugar policy reforms: the Sugar Milling sector (SMI sector) facing a 59% decrease in the export price of sugar from its preferential price levels with the European Union to the world price, a 45% decrease in the Mauritius sugar export price by the United States to the world price, and the sugar sector facing world prices for sugar rather than the preferential price as given by both the European Union and the United States?

2. What sugar export price reform, if any, dominates in isolation and when combined with the unilateral free trade with the European Union; the Southern African Customs Union; the United States and the Southern African Customs Union; and unilateral tariff liberalization with all of its trade partners, highlighting which policy or set of policies are most welfare-improving?

This will answer what combination of policies yield the best welfare outcome and if sugar reforms alone or the combination of sugar or tariff reforms dominate in terms of welfare effects.

The study is organized as follows. Chapter 2 will describe the Mauritian computable general equilibrium model in particular. It will provide the model specification and data used to calibrate the model.

Chapter 3 will present the simulation results for the Mauritius sugar export price reductions by the European Union, the United States, and by the European Union and the United States jointly for the value-added and lump-sum tax replacement. In particular, the effects on output, exports, imports, welfare, the foreign exchange, the value-added tax rate, the lump-sum tax, the skilled labor wage, the unskilled labor wage, and the rental rate of capital will be addressed.

Chapter 4 will report each sugar export price reduction scenario with the various trade policy scenarios, namely the removal of the preferential price for sugar by the

European Union, the removal of the preferential price of sugar by the United States, or the joint preferential price removal by the European Union and the United States, combined with unilateral tariff liberalization with the EU; the SACU; the U.S. and SACU; and with all of its trade partners. This chapter provides analysis for the simulation results and highlights the additional changes incurred from the tariff removal being considered along with the sugar export price change. It will present, if applicable, the most welfare-improving scenario.

Lastly, Chapter 5 will reiterate key findings, introduce future research opportunities, present policy recommendations, and thus conclude the study.

2.0 CHAPTER 2

Chapter 2 will acquaint the reader with the specification and calibration of the Mauritian computable general equilibrium model used to quantify the sugar price changes for the European Union and United States and various tariff liberalization policies, coupled with the subsequent updates in the sugar prices, tariff rates, and tax structures concurrently. The first section will provide the model specification that includes the explanation of model's structure, its parameters, variables, and equations for this study. The calibration of the model will be presented in the second section, where all the data used in the model as well as parameter values needed to complete the simulations will be introduced. This chapter will display the country-specific features of the computable general equilibrium model adopted for Mauritius.

2.1 MODEL SPECIFICATION

There are several components that are necessary to build a computable general equilibrium model. The analytical framework of the economy, followed by the model's corresponding variables, parameters, and equations will be addressed in that order. Each facet will lend to the complete specification of the Mauritian CGE model.

2.1.1 Framework

The framework chosen for investigating the changes in the sugar and tariff policies of the Mauritian economy is a version of the Konan and Maskus (1997, 2000) model.[93] This model is a single economy, static, real economy model. It does not contain any assets, money, interest rates, expectations or dynamics. It models a small open economy where households and production decisions are chosen in an optimizing framework. It explicitly captures bilateral trade flows with the European Union (EU), the Southern African Customs Union (SACU), the United States (U.S.), and the Rest of the World (ROW).[94] Under the small economy assumption, policy changes adopted by Mauritius do not change prices in other regions. Also, I assume no market imperfections exist (firms are perfectly competitive), that there is a fixed factor supply, and that there is full employment. Assume primary inputs are fully mobile across sectors as well.

Mauritius does not discriminate across sources of imports. Thus, the average tariff rates by sector are applied to all regions in the benchmark case. But, the rates by region are weighted across the sectors by the calculated regional import shares. The assumption that goods are differentiated across domestic and foreign sources of supply is adopted as well, such that Mauritian export and import prices differ across regions.[95] In other words, trade relations are modeled using Armington (1969) assumption, where both

[93] See Maskus and Konan, 1997 and Konan and Maskus, 2000 papers for small open economy Egyptian-specific CGE structure.
[94] These are ranked in order of the average regional import shares from 1969-2003, sans the Rest of the World, with the EU, SACU, and U.S. comprising 30.1%, 10.4%, and 3.6% of the total import volume respectively. Please note that the Rest of the World is inclusive of all non-EU, non-SACU, and non-U.S. trade.
[95] Such flexibility ensures the ability to isolate sugar export price changes by region as well as allowing for trade liberalization for each region singularly or jointly, with any combination thereof.

intermediate inputs and final goods are differentiated by country of origin. Imported intermediate inputs of each commodity are aggregated into a constant elasticity of substitution (CES) composite import allowing for imperfect substitution across regional supply sources of imports. And, the intermediate use of each commodity is a CES composite of domestic and imported sources of supply.

During the implementation of policy changes, government finances are controlled (i.e. the policy changes are assumed to be revenue-neutral). Tariff reforms will directly impact public revenues, where in the benchmark year of this study (1997), the import duties comprised exactly 33.1% of total government revenue. Also, in the updated benchmark year (to be discussed in Section 2.2.3.), by 2000 the import tariffs are 31.4% of total government revenues.[96] The assumption applied here is that government consumption does not change despite the policy change(s) adopted. Given the current trends in tax policy, the value-added tax is the key tax instrument most likely to be used in the economy. As a result, the value-added tax or the non-distortionary lump-sum tax is employed to keep sugar and tariff changes fiscally neutral in the macroeconomy, thus invoking revenue-neutrality.[97]

In the Mauritian model, analysis is limited to sugar price changes, tariff liberalization, with the domestic tax policy changes of 1997-2000 explicitly modeled. And, the sugar, tariff, and tax policy changes are adopted, holding all other market interventions constant. Also, as previously stated, the model's focus is on the real economy. However, the real exchange rates adjust to maintain the current-account

[96] The share of total government revenue is from the Author's calculations. The data was derived from the Bank of Mauritius, Annual Report - Various Years.
[97] The value-added tax replaces the sales tax in the update for the model, using the value-added tax rates of the year 2000. At that time, all other indirect taxes net of subsidies rates are kept constant.

position of the 1997 benchmark year. Also, this model only captures the formal sector since inadequate data existed for informal activities in the economy.

There are 11 sectors producing output in the Mauritian economy, each using three factors of production: labor, capital, and intermediate inputs. In the agriculture industry, there are two sectors, three sectors in the manufacturing industry, and six in the services industry.

2.1.2 Variables, Parameters, and Equations

The underlying structure of the Mauritian computable general equilibrium model can be more readily viewed through the introduction of the model's associated variables, parameters, and equations. First, variables needed to define the prices, activity and income levels, which characterize the economic equilibrium, are presented. Second, the parameters necessary for the model are the various elasticities, tax rates, factor endowments, and prices of imports and exports by region. The entire list of the variables and parameters, along with their corresponding symbols and definitions can be found explicitly stated in Table 2. Table 2 is as follows:

Table 2: Notation Used in the Mauritian Computable General Equilibrium Model

Variable or Parameter	Definition
	Variables
L_i	Labor input
K_i	Capital input
V_i	Value-added
M_i	Total imports
M_{ri}	Imports from region r
M_{iN}	Imports of commodity i for intermediate use
m_{riN}	Imports for intermediate use from region r
z_{ji}	Composite intermediate input of j into i
d_{ji}, m_{ji}	Intermediate usages of domestic and imported goods
Y_i	Output of good i
D_i, X_i	Output for domestic sales and exports
D_{iC}, D_{iG}	Domestic sales for private and public consumption
D_{iI}^F	Domestic sales for fixed capital formation
X_{ri}	Exports of good i to region r
c_i	Index of marginal cost of production
p_i	Domestic producer price index
$\tilde{p}_i^Z$, $\tilde{p}_i^C$, $\tilde{p}_i^{IF}$, $\tilde{p}_i^G$	Domestic price indexes (across home and imported prices)
w_{Ki}, w_{Li}	Factor price indices
U	Utility

Table 2 (continued)

$\tilde{p}_i$	Composite price index for total domestic consumption
C_i , G_i	Private and public consumption
I_i^F , I_i^I	Fixed capital formation and inventory investment
M_{iC} , M_{iG}	Imports for private and public consumption
M_{iI}^F	Imports for fixed capital formation
M_{riC} , M_{riG}	Imports for private and public consumption from region r
M_{riI}^F	Imports for fixed capital formation from region r
e	Real exchange rate (price index for foreign exchange)
B	Current-account balance
D	Government budget deficit (held fixed)
S_i	Supply on domestic market (D_i+M_i)
F_{ki}	Usage of factor k in sector i
p_{ri}^N	Domestic price index for intermediate imports
p_{ri}^C , p_{ri}^G	Domestic price index for imports for private and public consumption
p_{riI}^F	Domestic price index for imports for gross capital formation
p_i^C	Price index for private consumption of domestic goods
p_{iI}^F	Price index for fixed capital formation from domestic goods
p_{ri}	Producer price index for goods exported to region r

Parameters

σ_L	Substitution elasticity between labor types
σ_i	Substitution elasticity between capital and labor

s_a	Substitution elasticity between intermediates and value added
s_i	Armington elasticity between regional imports
s_j	Substitution elasticity between domestic and imported intermediates
ε_i	Transformation elasticity between domestic and exported output
e_i	Transformation elasticity between regional exports
ψ_i	Substitution elasticity between domestic and imported consumption
τ_{Vi}	Value-added tax
t_{ri}	Tariff rate on imports from region r
E_k	Endowment of factor k
p_{ri}^m	Price of imports from region r
p_{ri}^x	Price of exports from region r

Thus concludes the parameter and variable listing.

Lastly, the equations themselves must be presented. The model can be divided into the production equations, the utility equations, budget constraints and balancing items, and the equations for price relationships and identities, with a model diagram embedded in both the production and utility equation sections. I will present each block of equations, along with explanation of what they represent.

2.1.2.1 Production Equations

This section will outline the production in the Mauritius model. The structure of production function is similar to the one found in the Konan and Maskus (1997) Figure 1.[98] The key differences are found concerning the labor characterization and the trade regions that are isolated. The division in labor established here is the skilled versus unskilled workers, and, the regions of interest are the European Union, the Southern African Customs Union, the United States, and the Rest of the World (EU, SACU, U.S., and ROW respectively). Figure 1 is a diagrammatical representation of the Mauritian-specific model structure for production. It is as follows:

[98] Maskus and Konan, 1997, p. 278.

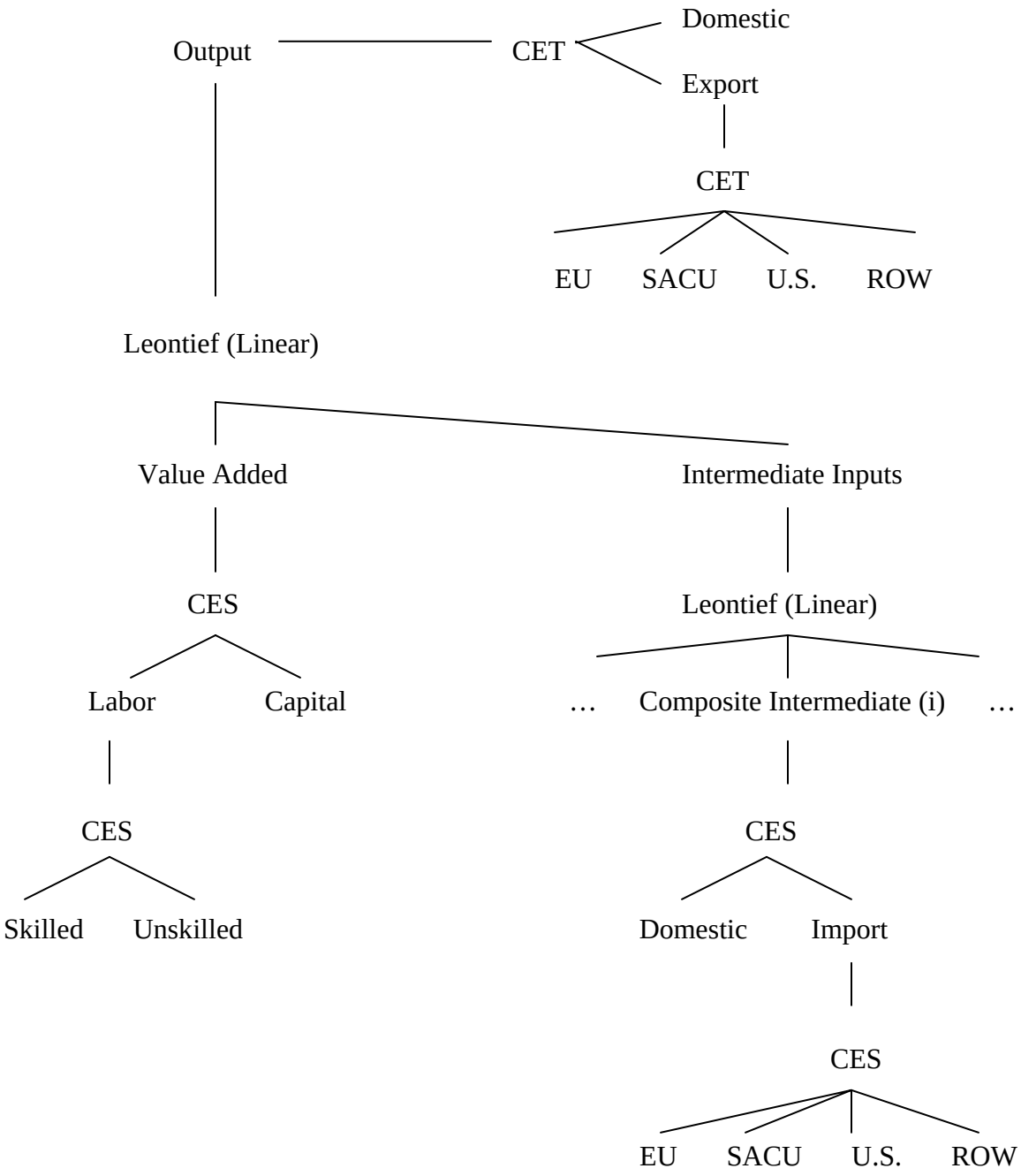

Figure 1. Mauritian-Specific Production Structure

Starting from the bottom left corner of Figure 1, let i represent a sector. There are 11 sectors (i = 1, …, 11). The aggregation of labor across types is given by the following equation:

$$(1) \qquad L_i = \left[b_{1i} L_{1i}^{\frac{(\sigma_L - 1)}{\sigma_L}} + b_{2i} L_{2i}^{\frac{(\sigma_L - 1)}{\sigma_L}} \right]^{\frac{\sigma_L}{(\sigma_L - 1)}} \quad \text{for i = 1, 2, ..., 11.}$$

L_i is aggregated labor input of the two types of workers in the model. b_{1i} and b_{2i} are the shares of labor types 1 and 2 respectively, where 1 represents skilled labor and 2 unskilled labor. σ_L is the substitution elasticity between skilled and unskilled workers. Thus, using a CES function, labor is further disaggregated into skilled and unskilled labor.

The value-added function is as follows:

$$(2) \qquad V_i = \left[a_{Li} L_i^{\frac{(\sigma_i - 1)}{\sigma_i}} + a_{Ki} K_i^{\frac{(\sigma_i - 1)}{\sigma_i}} \right]^{\frac{\sigma_i}{(\sigma_i - 1)}} \quad \text{for all i.}$$

V_i is the value-added. a_{Li} and a_{Ki} are the share parameters of labor and capital respectively. L_i is the labor input. K_i is the capital input. Lastly, σ_i is the substitution elasticity between capital and labor. A constant elasticity of substitution production function here describes the substitution between labor and capital inputs into the real value-added nest.

Imported intermediate inputs of the 11 commodities are aggregated into a CES composite import good, enabling the substitution across the regions of supply (EU, SACU, U.S., and ROW). This is done according to the Armington (1969) assumption. Imported intermediates are defined as:

$$(3) \qquad M_{iN} = \left[\sum_r \delta_{ri} m_{riN}^{\frac{(s_i-1)}{s_i}} \right]^{\frac{s_i}{(s_i-1)}} \quad \text{for all i = 1, 2, …, 11 and r = 1, 2, …, 4.}$$

M_{iN} represents the aggregate imports of commodity i for intermediate use. δ_{ri} is the share parameter for region r of commodity i. m_{riN} denotes the imports for intermediate use from region r. s_i is the Armington elasticity across regional imports. Equation (3) allows the modeling of imperfect substitutability of intermediate commodities across different regions, or rather the intermediate goods are differentiated by region of origin.

Composite intermediate input is defined as:

$$(4) \qquad z_{ji} = \left[\gamma_{di} d_{ji}^{\frac{(s_j-1)}{s_j}} + \gamma_{mi} m_{ji}^{\frac{(s_j-1)}{s_j}} \right]^{\frac{s_j}{s_j-1}} \quad \text{for all i = 1, 2, …, 11 and j = 1, 2, …, 11.}$$

z_{ji} is the composite intermediate input of j into good i, where j = 1, 2, …, 11. γ_{di} and γ_{mi} are share parameters for intermediate domestic usage and imported intermediate usages into good i. d_{ji} and m_{ji} are the intermediate usages of domestic and imported goods, and s_j is the substitution elasticity between domestic and imported intermediates. Composite intermediate inputs are demanded with fixed coefficients.

The mathematical representation of final outputs is

$$(5) \qquad Y_i = \min\left[\frac{z_{1i}}{a_{1i}}, ..., \frac{z_{ni}}{a_{ni}}, \frac{V_i}{a_{VA}} \right] \text{ (Leontief) for i = 1, 2, …,11.}$$

Y_i is the output of good i, V_i is value-added, a_{1i}, …, a_{ni} are the input-output coefficients as given in the 1997 Input-Output Table for Mauritius which will be presented in the data section, and s_a is the substitution elasticity between intermediate inputs and value-added. Thus, final outputs are produced in a Leontief function with intermediate inputs and real value-added.

Output Y_i is split exhaustively between domestic and foreign sales. The constant elasticity of transformation (CET) function for domestic and foreign sales is defined as:

$$(6) \qquad Y_i = \left[\alpha_{Di} D_i^{\frac{(\varepsilon_i - 1)}{\varepsilon_i}} + \alpha_{Xi} X_i^{\frac{(\varepsilon_i - 1)}{\varepsilon_i}} \right]^{\frac{\varepsilon_i}{(\varepsilon_i - 1)}} \quad \text{for all i.}$$

α_{Di} and α_{Xi} are the share parameters of domestic and foreign sales. D_i is the output for domestic sales and X_i is the output for exports, where the latter is also known as the export allocation. ε_i is the transformation elasticity that exists between domestic and exported output. The function found in equation (6) affords the imperfect substitutability between goods slated for domestic sales and those earmarked for foreign sales.

The allocation of exports across each region of destination is dependent on an Armington CET. Export allocation, X_i, is mathematically defined as

$$(7) \qquad X_i = \left[\sum_r \beta_{ri} X_{ri}^{\frac{(e_i - 1)}{e_i}} \right]^{\frac{e_i}{(e_i - 1)}} \quad \text{for i = 1, 2, …, 11 and r = 1, 2, …, 4.}$$

β_{ri} is the share parameter for region r for good i. X_{ri} is defined as the exports of good i to region r. e_i denotes the transformation elasticity between regional exports. Equation (7) allows for a difference in goods shipped across regions (i.e. better quality goods flow to region X than to region Y).

The zero profit condition holds for firms. As a result, price equals marginal cost of output. Thus, the marginal cost condition can be defined as follows:

$$(8) \qquad c_i Y_i = \sum_j p_j d_{ji} + \sum_j \sum_r (1 + t_{rj}) p_{rj}^m m_{rji} + \sum_i w_{Ki} K_i + w_{L1} L_{1i} + w_{L2} L_{2i}$$

for all i = 1, 2, …, 11 and j = 1, 2, …, 11.

c_i is the index of marginal cost production. p_j is the price of the composite intermediate domestic good. As previously stated, d_{ji} is the intermediate usage of domestic goods. t_{rj} is the tariff rate on imports from region r of composite intermediate input of j. p_{rj}^m is defined as the price of imports from region r for input j. m_{rji} is the intermediate input of j into good i. w_{Ki} and w_{Li} are the factor price indexes for capital and labor respectively. Assume w_{Li} is equal to one. Please note that intermediate inputs are disaggregated into domestic sources and imports to allow tariffs into purchases for the production sector.

2.1.2.2 Utility Equations

Now, focusing on demand, assume that a single household represents domestic consumers. The consumer maximizes a CES utility function with a multi-staged budget process. Figure 2 displays the utility model structure for the consumer.

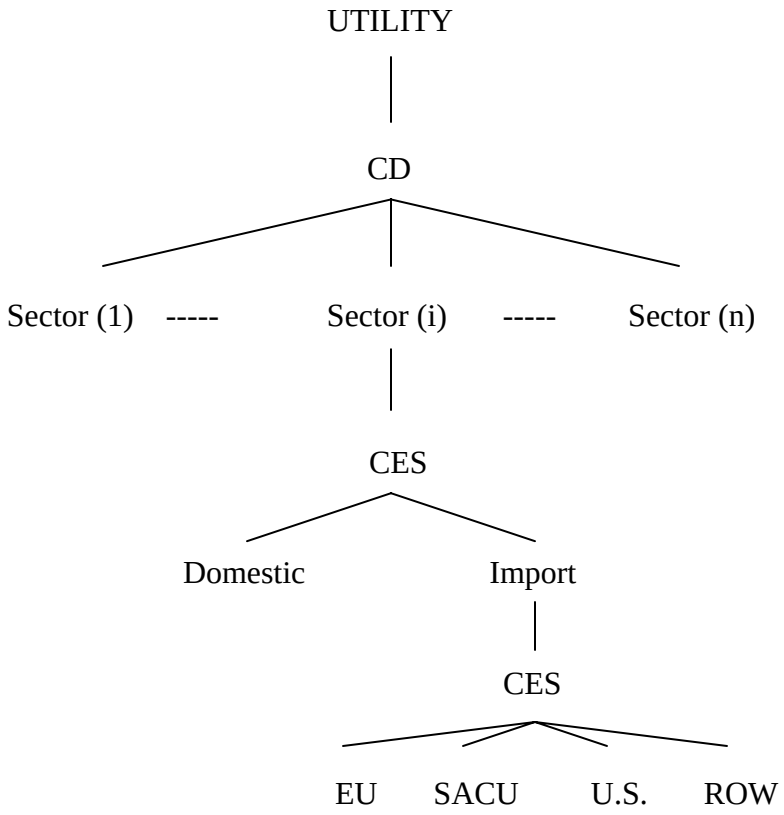

Figure 2. Mauritian-Specific Utility Structure

Starting at the top of Figure 2, stage one is comprised of the consumer deciding on how much to spend on goods from each sector (i=1, 2, …, 11) in a Cobb-Douglas (CD) utility nest given the budget constraint. Assume that all income elasticities across all sectors are unity within this CD utility nest. Stage two is a CES nest as well, but here the consumer decides on domestic and aggregate import expenditures in each sector. Then, based on the consumer's budget for imports, he/she selects purchases of imports from each region in an Armington CES nest. Please note that the stage two CES nest applies to government consumption and investment spending on domestic and imported goods and services as well.

In particular, the consumer's utility function is defined as

(9) $$U = \prod_i C_i^{\lambda i} \; ; \; \sum_i \lambda_i = 1 \; \forall \text{ i.}$$

where U is utility, C_i is private consumption, and λ_i is the substitution elasticity across consumption of all goods.

The second nest is a constant elasticity of substitution function across domestic and import consumption. C_i is as follows:

(10) $$C_i = \left[\phi_{Di} D_{iC}^{\frac{(\psi_i - 1)}{\psi_i}} + \phi_{MiC} M_{iC}^{\frac{(\psi_i - 1)}{\psi_i}} \right]^{\frac{\psi_i}{(\psi_i - 1)}} \quad \text{for all i = 1, 2, …, 11.}$$

ϕ_{Di} and ϕ_{MiC} are share parameters for domestic sales and imports for private consumption, D_{iC} is defined as the domestic sales for private consumption, M_{iC} denotes the imports for private consumption, and ψ_i is defined as the substitution elasticity between domestic and imported consumption. Public consumption can be shown in a similar fashion as equation (10a),

(10a) $$G_i = \left[\phi_{Di} D_{iG}^{\frac{(\psi_i - 1)}{\psi_i}} + \phi_{MiG} M_{iG}^{\frac{(\psi_i - 1)}{\psi_i}} \right]^{\frac{\psi_i}{(\psi_i - 1)}} \quad \text{for all i = 1, 2, …, 11,}$$

where G_i is public consumption, ϕ_{Di} and ϕ_{MiG} are the share parameters for domestic sales for public consumption and imports for public consumption, D_{iG} is domestic sales for public consumption, and M_{iG} denotes imports for public consumption. Likewise, fixed capital formation consumption is defined as:

(10b) $$I_i^F = \left[\phi_{Di} D_{iIF}^{\frac{(\psi_i - 1)}{\psi_i}} + \phi_{MiIF} M_{iIF}^{\frac{(\psi_i - 1)}{\psi_i}} \right]^{\frac{\psi_i}{(\psi_i - 1)}} \quad \forall \text{ i.}$$

I_i^F is fixed capital formation, and ϕ_{Di} and ϕ_{MiIF} (or ϕ_{MiI}^F) are defined as the share parameters for domestic sales for fixed capital formation and imports for fixed capital formation. D_{iIF} (or D_{iI}^F) denotes the domestic sales for fixed capital formation. M_{iIF} (or M_{iI}^F) is simply the imports for fixed capital formation.

In selecting purchases from each region, the CES import allocation, M_{iC}, is

$$(11) \qquad M_{iC} = \left[\sum_r \delta_{ri} M_{riC}^{\frac{(s_i-1)}{s_i}} \right]^{\frac{s_i}{(s_i-1)}} \quad \text{for all i = 1, 2, …, 11 and r = 1, 2, …, 4.}$$

Here, δ_{ri} is a share parameter of imports across region r of good i and M_{riC} is defined as the imports for private consumption from region r of good i. s_i, as before, is defined as the Armington elasticity across regional imports. However, this equation applies to imports for public consumption from region r and imports for fixed capital formation from region r also. Imports for public consumption can be expressed as

$$(11a) \qquad M_{iG} = \left[\sum_r \delta_{ri} M_{riG}^{\frac{(s_i-1)}{s_i}} \right]^{\frac{s_i}{(s_i-1)}} \quad \forall \text{ i and r,}$$

and imports for fixed capital formation as

$$(11b) \qquad M_{iI}^F = \left[\sum_r \delta_{ri} M_{riIF}^{\frac{(s_i-1)}{s_i}} \right]^{\frac{s_i}{(s_i-1)}} \quad \text{for all i = 1, 2, …, 11 and r = 1, 2, …, 4.}$$

M_{riG} denotes imports for public consumption from region r of good i and M_{riIF} (M_{riI}^F) is imports for fixed capital formation from region r of good i. These equations determine domestic and imported commodity expenditures in government consumption and investment spending respectively.

2.1.2.3 Budget Constraints and Other Closure Items

This study is static. Therefore, agents optimize over a single time period. Assume a single household is a domestic consumer representative (RA). Capital stock is exogenously fixed at the benchmark level. The exogenous capital stock ensures that the savings-investment balance is fulfilled. Capital stock is financed through forced consumer savings which operate as a direct lump-sum tax. A capital good is modeled as a composite of goods with fixed weights. Firms buy composite capital goods based on their preferences. The index price of composite capital good, or the interest rate, is endogenous and is determined by factor-demand conditions. The savings-investment balance comes directly from the agent's budget constraint. The agent's budget constraint is

$$(12) \qquad \sum_i \tilde{p}_i^{\,C} C_i = \sum_i w_{Ki} K_i + w_{L1} L_1 + w_{L2} L_2 + eB - \sum_i \tilde{p}_i^{\,IF} I_i^F - \sum_i p_i I_i^I - D \;\; \forall \text{ i.}$$

e is the real exchange rate. B is the current-account balance. D is the government budget deficit. $\tilde{p}_i^{\,C}$ and $\tilde{p}_i^{\,IF}$ are domestic price indexes across home and imported prices for private consumption and fixed capital formation. Private income is derived from primary factors, net government transfers, and the current-account deficit, while the representative agent pays for fixed capital formation and inventory investment. The cost-of-living index associated with the utility function is the numeraire. Also, the index of welfare effects in this study is defined as the change in aggregate consumption. In other words, changes in

the aggregate consumption are an explicit measure of the equivalent variation of policy changes.[99]

Let τ_{Vi} be the value-added tax rate. Returning to budget constraints, the government is also a maximizing agent. Thus, the government has a budget constraint and it is as follows:

$$(13) \quad \sum_i \tilde{p}_i^{G} G_i = D + \sum_i \tau_{Vi} \left(\tilde{p}_i^{C} C_i + \tilde{p}_i^{IF} I_i^F \right) + \sum_i \sum_r (1+\tau_{Vi}) t_{ri} p_{ri}^m \left(M_{riC} + M_{riI}^F \right)$$

for all i = 1, 2, …, 11 and r = 1, 2, …, 4

where $\tilde{p}_i^{G}$ is a domestic price index. The government budget deficit D is deducted from agent's available income and transferred to the government for consumption. The deficit is fixed. Assume that the government consumes an unchanged bundle of goods and services for all policy adoptions (at all prices). Hence, the government has Leontief preferences. As a result, if a policy causes prices to fall, the tax revenue to finance the bundle decreases, and this tax saving is transferred to the consumer. But, if trade liberalization causes tax revenues to be lost, revenues are replaced by allowing tax rates to vary. In this model, there are two tax instruments that will be employed for revenue replacement: the value-added tax, which varies across sectors, and a lump-sum tax replacement that is explicitly defined by the calculation of the fixed deficit. The budget

[99] Equivalent variation is the Hicksian measure of change in consumer surplus, measuring how much better or worse off the representative agent is in the equilibrium after a policy change than it was in the initial equilibrium, with the base prices as a reference. It is defined as the income change that would be equivalent to the household utility change resulting from the policy change, or rather the minimum income necessary to reach the utility level after the policy change given the initial price less the minimum income necessary to reach the initial utility level given the initial price. If the equivalent variation is positive, then households are better off given the policy change. If it is negative, they are worse off. See Wang and Zhai, 2000, p. 375, for an explicit mathematical description.

constraint reflects taxes on consumption and tariff revenues. The value-added tax is imposed on goods and services from domestic and foreign sources for private consumption and investment. The tariff rates are applied to the imports of goods and services for consumption and investment.

Another closure rule embedded in the model is the fixed current-account balance, where it is fixed exogenously at world prices even though its value depends on the endogenous exchange rate. The current-account balance is defined as follows,

(14) $$B = \sum_r \sum_i \left(\frac{1}{e}\right)\left(p_{ri}^{m} M_{ri} - p_{ri}^{x} X_{ri}\right)$$ for all r = 1, 2, …, 4 and i = 1, 2, …, 11.

M_{ri} represents the imports from region r and p_{ri}^{x} is the price of exports in region r of good i. The current-account imbalance B is fixed at its benchmark level. Foreign currencies are scaled such that the world price index is fixed at one. However, Mauritius holds a current-account deficit in 1997 and since the current-account is fixed exogenously, it is modeled as an addition to the agent's income through exogenous capital inflows (see equation 12). And, given that the imports and exports of goods and services by region are endogenous, a balancing item is required to hold the current-account imbalance fixed at constant world prices. Thus, an endogenous exchange rate e is used. A change in the "real exchange rate" is simply a change in the home price index that sustains a constant current-account deficit at fixed world prices. More specifically, it is the shadow price of foreign exchange necessary to maintain a constant imbalance. Thus, to hold B and international prices constant, the real exchange rate e must change as

import and export volume changes. And, a rise in the real exchange rate coincides with a depreciation of home currency (the per-unit price of foreign exchange rises).[100]

The closure of the Mauritius model is further completed by the inclusion of the product and factor market clearing conditions and the supply value balance. The product and factor market clearing conditions are:

(15) $S_i = \sum_j a_{ij} Y_j + C_i + G_i + I_i^F + I_i^I$ for all i = 1, 2, …, 11 and j = 1, 2, …, 11

and

(16) $\sum_i F_{ki} = E_k$ for all k = L_1, L_2, and K and i = 1, 2, …, 11

respectively. S_i is the supply on the domestic market. It is the sum of output for domestic sales (D_i) and total imports (M_i) in the economy. F_{ki} is the usage of factor k in sector i. E_k is the endowment of factor k, where k is either skilled labor (L_1), unskilled labor (L_2), or capital (K). Please note that factor markets always clear with flexible prices.

Production exhibits constant returns to scale and firms behave competitively, where price equals the marginal cost. With marginal cost defined (see equation 8), the zero profit condition is as follows:

(17) $p_i D_i + \sum_r p_{ri}^x X_{ri} = c_i Y_i$ for all i,

where p_i is the domestic producer prices, D_i is output for domestic sales, p_{ri}^x is the price of exports in region r, and X_{ri} is the exports of good i to region r, such that the domestic sales value plus the export sales value is equal to the marginal cost of production.

[100] With exogenous fixed capital inflows, the price of exports and the price of imports exogenously given, no "free lunch" is taken from or given to foreigners in equation 14. For more information, please see Rutherford, Rüstrom, and Tarr, 1997, p. 247.

The supply value balance is

$$(18)\quad \tilde{p}_i S_i = \tilde{p}_i^{Z} \sum_j a_{ij} Y_j + (1+\tau_{Vi})\left(\tilde{p}_i^{C} D_{iC} + \tilde{p}_{iI}^{F} D_I^F \right) + \tilde{p}_i^{G} D_{iG} + \tilde{p}_{iI}^{F} I_i^F$$
$$+ \sum_r (1+\tau_{Vi})(1+t_{ri}) p_{ri}^m \left(M_{riC} + M_{riI}^F \right) + \sum_r (1+t_{ri}) p_{ri}^m M_{riG} \quad \forall \text{ i, j, and r.}$$

$\tilde{p}_i$ denotes the composite price index for total domestic supply. $\tilde{p}_i^{Z}$ is the domestic price index for composite intermediate goods. The domestic market supply value is equal to the intermediate sales value plus the domestic sales for private consumption and fixed capital formation with the value-added tax levied on them, domestic sales value for public consumption and inventory investment, the import value for private consumption and fixed capital formation incorporating the value-added and tariff taxes, and the import value for government consumption gross of tariffs.

2.1.2.4 Identitities and Price Relationships

The closure of the Mauritius model is completed by the inclusion of the identities and price relationships. The aggregation of domestic and import sales must be established. D_i, the output for domestic sales, is explicitly defined as

$$(19)\quad D_i = D_{iC} + D_{iG} + D_{iI}^F + I_i^I \quad \text{for i = 1, 2, …,11.}$$

D_{iC} and D_{iG} are the domestic sales for private and public consumption, respectively. D_{iI}^F is defined as the domestic sales for fixed capital formation. Thus, total output for domestic sales is the sum of domestic sales across private and public consumption, fixed capital formation, and inventory investment demands.

The components of import sales is constituted of the imports for intermediate use, imports for private consumption, imports for fixed capital formation, and imports for government consumption. Thus, total imports is defined as:

(20) $M_i = M_{iN} + M_{iC} + M_{iG} + M_{iI}^F$ for all i,

where M_i denotes total imports. Thus, the total imports of good i is equal to the intermediate imports plus the imported final demand from private and public consumption as well as fixed capital formation.

The price relationships have yet to be established. Equations for domestic price of intermediate imports and government consumption are as follows:

(21) $p_{ri}^N = (1 + t_{ri}) p_{ri}^m$ for all r = 1, 2, …, 4 and i = 1, 2, …, 11

and

(21a) $p_{ri}^G = (1 + t_{ri}) p_{ri}^m$ for all r and i

where p_{ri}^N is the domestic price index for intermediate imports and p_{ri}^G is the domestic price index for public consumption. These prices do not include the value-added tax because it is not levied on intermediate imports nor is it levied on imported final demand for government consumption.

Domestic price of imports for consumption, C, on the other hand is

(22) $p_{ri}^C = (1 + \tau_{Vi})(1 + t_{ri}) p_{ri}^m \ \forall$ r = 1, 2, …, 4 and i = 1, 2, …, 11.

p_{ri}^C denotes the domestic price index for private consumption. Here, the price of imports reflects the two taxes levied on it, the value-added tax and tariffs. In this case, equation (22) holds for fixed capital formation as well. Thus, it follows that domestic price for imports of fixed capital is mathematically denoted as:

(22a) $p^F_{riI} = (1+\tau_{Vi})(1+t_{ri})p^m_{ri}$ $\forall$ r and i.

p^F_{riI} denotes the domestic price index for imports for gross capital formation.

The consumer price of domestic goods and fixed capital can be shown as:

(23) $p^C_i = (1+\tau_{Vi})p_i$ for all i = 1, 2, …, 11 and r = 1, 2, …, 4

and

(23a) $p^F_{iI} = (1+\tau_{Vi})p_i$ for all i and r.

p^C_i is the price index for private consumption of domestic goods and p^F_{iI} is the price index for fixed capital formation of domestic goods. Consumer prices are gross the value-added tax because the value-added tax is levied on final demand for private consumption and investment.

Next, the producer prices of exported goods must be defined as well. Its mathematical representation is in equation (24)

(24) $p_{ri} = p^x_{ri}$ $\forall$ r = 1, …, 4 and i = 1, …, 11.

p_{ri} is the producer price index for goods exported to region r. All prices are one except for the European Union, which has a price of 2.44, and the United States that has a price of 1.85, for the Sugar Milling sector to reflect the preferential pricing agreements the regions have with Mauritius.

Lastly, capital market equilibrium from capital mobility must be explained. For perfectly mobile capital, the price of capital is the same across all sectors:

(25) $w_{K1} = ... = w_{Kn}$.

Hence, the Konan and Maskus (1997, 2000) model is adopted to capture policy reforms and adapted to the Mauritian economy. Thus concludes the modeling section for Mauritius.

2.2 MODEL DATA AND CALIBRATION

Certain data are necessary to simulate economy-wide changes. Data for the Mauritius model is calibrated using several sources. The 1997 Supply and Use Table, the substitution, Armington and transformation elasticities for trade and other parameters, namely the regional trade shares, indirect tax rates, value-added tax rates, import tariff rates, and the labor force composition comprise the data. However, the tariff rate changes and the value-added tax introduction are incorporated into the model, thereby calculating a new benchmark from which all other simulations are performed. Please note that for 1997, the initial benchmark year, a consistent tie between intermediate demand, final demand, indirect taxes net of subsidies, and tariffs is established.

2.2.1 1997 Supply and Use Table and the Computed Input-Output Table

The 1997 Supply and Use Table affords me the opportunity to compute the 1997 Input-Output Table (IO Table) for Mauritius.[101] There are a total of 15 main sectors and 54 total sub-sectors explicitly defined in the Supply and Use Table. These 54 sub-sectors are aggregated into sensible conglomerates in the next step, creating 11 total sectors in the study. The sectors created are as follows: Sugarcane (SUG), Other Agriculture (OAG), Sugar Milling (SMI), Export Processing Zone Manufacturing (EPZ), Other Manufacturing (OMA), Electricity, Gas and Water (EGW), Construction (CON),

[101] The 1997 Supply and Use Table can be found in Appendix A.

Wholesale and Retail Trade and Repairs (WRT), Restaurants and Hotels (RAH), Transport, Storage and Communication (TSC), and Other Services (OSR).[102]

The next course of action is to match the products listed in the Supply and Use Table to the 11 sectors. There are a total of 61 goods that are assigned to its corresponding sector.[103] Please note that if a good was produced by more than one sector, usage of said good was assigned to each sector by the sector's percentage of total supply of the good. In addition to usage, the supply share allocation is applied to the private consumption, government consumption, investment, change in inventories, and the exports of goods and services columns for consistency.

With the aggregation into 11 sectors and 11 goods, the 1997 Input-Output Table aggregation yields a summary description of the Mauritian economy. Please find the Computed 1997 Input-Output Table for Mauritius as follows:

[102] Appendix B displays the aggregation from the 54 sub-sectors of the 1997 Supply and Use Table to the 11 sectors used in this model.
[103] See Appendix C for the goods assignment to each sector.

Table 3: Computed 1997 Input and Output Table[104]

Output ↓ / Input →		1	2	3	4	5	6	7	8	9	10	11	Total Inter-Industry	Household Consumption	Government Consumption	Gdfcf	Change in Inventories	Exports of Goods and Services	Imports of Goods and Services (CIF)	Total Final Demand	Total Demand
		Quadrant I - Inter Industry												Quadrant II - Final demand							
1	Sugarcane	0	0	5,885,000	0	0	0	0	0	0	0	0	**5,885,000**	0	0	0	0	0	0	0	**5,885,000**
2	Other Agriculture	3,209	563,615	1,321	462,839	3,803,112	32,062	24,361	2,326	4,578	12,102	17,420	**4,926,945**	3,366,112	0	113,624	-2,514,883	728,339	2,583,973	-890,581	**4,036,364**
3	Sugar Milling	0	0	0	15,010	164,336	0	0	0	2	0	0	**179,347**	481,088	0	0	675,933	7,597,182	301,595	8,452,608	**8,631,955**
4	EPZ Manufacturing	30,343	13,467	12,496	13,432,316	969,295	56,760	230,367	11,014	45,503	151,711	281,242	**15,264,534**	2,921,303	0	1,923,880	-2,015,927	24,196,934	13,188,764	13,837,426	**29,101,960**
5	Other Manufacturing	610,459	203,494	251,408	3,994,892	5,717,697	1,107,131	4,634,434	161,563	240,493	1,877,432	2,172,178	**20,971,187**	15,023,096	1,264	11,172,519	6,211,778	4,670,804	31,477,467	5,601,974	**26,573,161**
6	Electricity, Gas & Water	77	23,321	41	3,182	1,267	244,578	42,338	66,820	130,767	56,884	275,640	**864,715**	2,252,032	2,671	0	-8	1,239	0	2,255,934	**3,120,649**
7	Construction	0	0	0	0	0	1,093	1,447,514	0	41,711	0	240,916	**1,731,234**	0	0	10,054,929	0	0	0	10,054,929	**11,786,163**
8	Wholesale & Retail Trade & Repairs	36,360	26,453	2,503	613	17,638	19,356	117,056	862,747	269,037	887,213	1,394,186	**3,613,162**	9,897,005	106,353	0	-303	49,363	0	10,052,418	**13,665,580**
9	Restaurants & Hotels	2,471	48	1,286	474	65	468	5,889	4,860	400,889	1,089,202	143,001	**1,648,623**	1,236,981	84,643	0	-240	6,375,517	1,823,000	5,873,901	**7,522,524**
10	Transport, Storage & Communication	665,972	35,241	811,944	389,901	340	325,876	88,374	1,614,592	587,739	1,368,889	1,515,101	**7,393,879**	8,540,221	297,991	0	-228	5,166,296	4,424,621	9,579,689	**16,973,538**
11	Other Services	368,209	7,220	215,001	85,689	7,413	77,533	802,403	654,129	1,230,566	2,754,269	5,453,753	**11,646,174**	11,338,163	11,015,077	216,824	-300	5,409,325	4,898,560	23,280,529	**34,926,703**
A	**Total Inter-Industry**	**1,707,800**	**872,879**	**7,181,000**	**18,384,926**	**10,711,162**	**1,864,847**	**7,392,716**	**3,398,851**	**2,951,280**	**8,167,502**	**11,493,437**	**74,124,800**	**55,056,001**	**11,507,999**	**23,481,776**	**2,256,022**	**54,194,999**	**50,498,000**	**88,098,797**	**162,223,597**
		Quadrant III - Primary inputs												Quadrant IV							
B1	Import Duties	0	245,285	26,286	1,579,234	3,896,889	0	0	0	0	0	409,506	**6,157,000**	0	0	0	0	0	0	0	**0**
B2	Taxes on Products	0	0	177,669	0	4,433,513	1,302	11,247	91,629	576,944	95,536	368,160	**5,756,000**								
B3	Subsidies on Products	0	-101,900	0	0	-419,600	0	-119,000	0	0	-55,000	-35,500	**-731,000**								
B4	Compensation of Employees	2,672,200	1,074,500	605,000	4,515,600	2,889,100	572,600	2,185,500	3,100,000	1,490,000	3,300,000	12,170,000	**34,514,300**						GDP at Market Prices =		
B5	Gross Operating Surplus	1,506,000	1,945,600	642,000	4,622,200	5,062,297	681,900	2,315,700	7,075,900	2,564,300	5,485,500	10,521,100	**42,402,497**						76,916,797 +5,756,000+6,157,000=		
Value Added (i.e.=(B1+B5))		**4,178,800**	**3,020,100**	**1,247,000**	**9,137,800**	**7,951,397**	**1,254,500**	**4,501,200**	**10,175,900**	**3,994,300**	**8,765,500**	**22,691,100**	**76,916,797**						88,829,797 Rs Thousands		
Total Inputs (A+B)		**5,885,800**	**4,036,364**	**8,631,955**	**29,101,960**	**26,573,161**	**3,120,649**	**11,786,163**	**13,665,580**	**7,522,524**	**16,973,538**	**34,926,703**	**162,223,597**								

[104] The Computed Input-Output Table is the Author's calculations from the Central Statistics Office, 1997 Supply and Use Table. For more details on aggregation, please see Appendices A-D. Please note that for the model, imports of goods and services are reported as cost in freight (CIF) and are gross of import duties such that the indirect taxes net of subsidies is the aggregate of Taxes on Products plus Subsidies on Products rows only.

Since, it is easier to focus on summary statistics gleaned from the Input-Output Table, I will present the information as a percentage of total domestic supply and then proceed to discuss the key characteristics of the economy. First, I will discuss the expenditure on gross domestic product as a percentage of total supply by sector for inter-industry sales, private consumption, government consumption, gross domestic fixed capital formation, change in inventories, exports of goods and services, and imports of goods and services. Then, I will present a cost summary for the Mauritian economy, reporting the share total for inter-industry inputs, labor and capital costs, and indirect taxes net of subsidies of the total domestic supply by sector.

2.2.1.1 Expenditure on Gross Domestic Product

Table 4 represents the expenditure on gross domestic product as a percent of domestic supply, where the total inter-industry sales, private and public consumption, fixed capital formation, change in inventories, and exports and imports of goods and services are reported by sector. Table 4 is as follows:

Table 4: Expenditure on Gross Domestic Product (As a Percentage of Total Domestic Supply)

Sector	Total Inter-Industry	Private Consumption	Government Consumption	Gross Domestic Fixed Capital Formation	Change in Inventories	Exports of Goods and Services	Imports of Goods and Services	Total Domestic Supply
SUG	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
OAG	130.0	88.8	0.0	3.0	-66.3	19.2	-74.6	100.0
SMI	2.1	5.6	0.0	0.0	7.9	88.3	-3.8	100.0
EPZ	55.5	10.6	0.0	7.0	-7.3	87.9	-53.7	100.0
OMA	92.5	66.2	0.0	49.3	27.4	20.6	-156.0	100.0
EGW	27.7	72.2	0.1	0.0	0.0	0.0	0.0	100.0
CON	14.7	0.0	0.0	85.3	0.0	0.0	0.0	100.0
WRT	26.4	72.4	0.8	0.0	0.0	0.4	0.0	100.0
RAH	21.9	16.4	1.1	0.0	0.0	84.8	-24.2	100.0
TSC	43.6	50.3	1.8	0.0	0.0	30.4	-26.1	100.0
OSR	33.7	32.5	31.9	0.6	0.0	15.7	-14.8	100.0
Total	47.5	35.3	7.4	15.0	1.5	34.7	-41.4	100.0

Please note that the sector abbreviations above are as follows: Sugarcane (SUG), Other Agriculture (OAG), Sugar Milling (SMI), Export Processing Zone Manufacturing (EPZ), Other Manufacturing (OMA), Electricity, Gas and Water (EGW), Construction (CON), Wholesale and Retail Trade and Repairs (WRT), Restaurants and Hotels (RAH), Transport, Storage, and Communication (TSC), and Other Services (OSR). Also, the Change in Inventories and Imports of Goods and Services columns' negative values are maintained for addition purposes (i.e. row totals for each sector equal 100.0%).

There are several important characteristics of the Mauritian economy that appear from the tables above. Total inter-industry sales dominate the domestic supply in the economy, with a share of 47.5% of the total domestic supply in 1997. Next, the imports of goods and services represent 41.4% of total domestic supply.[105] Then, private consumption follows the imports of goods and services share of total domestic supply, where it accounts for 35.3% of total supply. The exports of goods and services is the fourth largest component of domestic supply, with a share of 34.7%. Gross domestic fixed capital formation constitutes 15.0% of total domestic supply, government consumption 7.4%, and change in inventories 1.5%. Thus, the most important components in the

[105] Please note that negatives are maintained to keep row totals equal to 100% across intermediate and final demands, which the latter in the IO Table is net imports.

1997 Mauritian economy are, in order of relevance, the inter-industry sales, imports of goods and services gross tariffs, private consumption, exports of goods and services, gross domestic fixed capital formation, government consumption, and then change in inventories.

Starting with inter-industry sales, four industries have at least 50% of their total domestic supply comprised of inter-industry sales: the Other Agriculture sector (130.0%); the Sugarcane sector (100.0%); the Other Manufacturing sector (92.5%); and the Export Processing Zone Manufacturing sector (55.5%).[106] In terms of the Other Agriculture sector, the Input-Output Table displays how the OAG sector sells its output to every sector in the economy, with the majority of products flowing into the Other Manufacturing sector. This attribute is logical given that the agricultural sector produces products of agriculture, horticulture and market gardening except sugar cane, live animals and animal products, as well as forestry and logging products, which are further processed by the Other Manufacturing sector (i.e. meat, fish, fruit, vegetables, oils, fats; dairy products; grain mills products, starches and starch products; other food products except sugar; beverages; tobacco products; pulp, paper and paper products; printed matter and related articles).[107] Other Agriculture also supplies a considerable amount to itself (i.e. hay to feed the horses, corn to feed pigs, etc.). Lastly, the Export Processing Zone Manufacturing sector also consumes a sizable amount of output from Other Agriculture (i.e. cow hides for leather and leather products, shoes; cotton for textiles, etc.).[108] Thus, the key sector consumers

[106] Totals greater than 100.0% reflect the inter-industry sales exceeded total domestic supply, i.e. inter-industry sales for the Other Agriculture sector exceeded total domestic supply by 1.300, which points to the import of goods and services for that sector augmenting total availability of goods and services in excess of what was produced domestically.

[107] The details provided on goods 11-13, 15-16, 22, and 25 produced by the Other Manufacturing sector are from the 1997 Supply and Use Table (see the Supply portion) in Appendix A. Since visibility is limited, the actual usage of the OAG sector's goods by the OMA sector is the Author's conjectures.

[108] For the Other Agriculture sector, the examples provided are best guesses of the actual own product usage in the OAG sector. Such visibility is not available. Also, the details provided on goods produced by EPZ sector using the OAG sector's products are from the 1997 Supply and Use Table (see goods 1 and 3) in Appendix A. Again, the visibility is limited, so the actual examples are the Author's conjectures.

for Other Agriculture are the Other Manufacturing sector, the Other Agriculture sector itself, and the Export Processing Zone Manufacturing sector.

Focusing on the Sugarcane sector, in 1997, it only had inter-industry sales, with no other economic activity outside of those sales (i.e. it did not sell to households or to the government, the sector did not engage in investment, did not draw down or bolster any inventory, nor is it traded at all). This is understandable given the key product for sugar production is sugarcane and the price the Sugar Milling industry receives for its product in the European Union and the United States is sufficient to keep its demand high enough to absorb all of the Sugarcane industry's output. The IO Table shows that in 1997 the Sugarcane sector's output is only sold to one sector, Sugar Milling. Hence, Sugarcane is heavily dependent on the Sugar Milling sector's demand in 1997.

Also, the Other Manufacturing sector sells a considerable amount of its output to other sectors. However, this directly follows from the OMA sector producing goods such as beverages; products of wood, cork, straw and plaiting materials; pulp, paper and paper products, printed matter and related articles; coke oven products, refined petroleum products, nuclear fuel; basic chemicals; other chemical products, man-made fibers; rubber and plastic products; glass and glass products and other non-metallic products; basic metals; fabricated metal products, except machinery and equipment; general and special purpose machinery; electrical machinery and apparatus; radio, television, and communication equipment and apparatus; and transport equipment in 1997.[109] The Input-Output Table affords greater visibility into the nature of the sales, displaying that the key consumers of its products are OMA itself, followed by the CON

[109] Please see goods 15, 21-27, 30-33, 35-36 listed in the Supply Table found in Appendix A.

sector, and then the EPZ sector.[110] Selling to itself is also logical given the sector could use its own glass products for bottling of beverages, corrugated boxes to ship machinery, apparatus or equipment, etc. The Construction sector buys stone, sand, and clay from the Other Manufacturing sector. Of course the product mix follows given the primary components of concrete, asphalt, or bricks are stone, sand, and/or clay. The EPZ sector's absorption of the OMA sector's output is a direct result of the EPZ sector consuming the OMA sector's chemical products (i.e. dyes for textile production in the EPZ sector).[111]

Lastly, the Export Processing Zone Manufacturing sector has considerable inter-industry sales in 1997 as well with 55.5% of its total domestic output supplying intermediate demand. Of the total inter-industry amount, 88.00% is used by the EPZ sector (i.e. yarn and thread for textiles, its key export) alone.[112] The sector would use yarn and thread to produce textiles and wearing apparel, thread to produce footwear and leather products, etc. Thus, the EPZ sector consumes a considerable amount of its own production. But, it did sell output to every sector. This also makes sense since it produces yarn, thread, tufted textile products, knitted fabrics, crocheted fabrics, wearing apparel, leather and leather products, footwear, furniture and other transportable goods, medical appliances, precision and optical instruments, watches, and

[110] From the OMA column, a total of 1,812,124 Rs Thousands or 1.8 billion rupees (6.38% of its total supply) is moved from the OMA column and allocated to the EPZ and OSR sectors to remove any supply and demand discrepancies. This movement adjusts the share numbers by sector of the OMA sector's inter-industry sales while maintaining the total demand of the OMA sector. The sector ordering by share remained the same even though the share totals may have adjusted slightly (the OMA sector is the largest consumer of its own product, followed by the Construction sector, and then the EPZ sector). For additional details, please see Appendix D.

[111] Since there is limited visibility into what the goods are used to produce in the purchasing sector, the examples given are the Author's conjectures relying on what the purchasing sector actually produced in 1997.

[112] Please see the 1997 Supply and Use Table to view the production of yarn and thread as well as the production of textiles by the EPZ sector.

clocks.[113] All in all, the Other Agriculture, Sugarcane, Other Manufacturing, and the Export Processing Zone Manufacturing sectors have substantial inter-industry sales of their output.

With private consumption as a percentage of total supply, five sectors supply in excess of 50% of their total domestic supply to private consumption. The Other Agriculture sector has the largest share for private consumption, where private consumption is 88.8% of its total domestic supply. As previously stated, the Other Agriculture sector produces products of agriculture, horticulture and market gardening except sugar cane, live animals and animal products, as well as forestry and logging products. Thus, private consumers buy food to eat (i.e. pineapples, steaks, beets, etc.), seeds for gardening or floristry (i.e. seeds for planting flowers), etc.[114] Thus, the Other Agriculture sector devotes a considerable portion of its domestic supply to consumer final demand.

Wholesale and Retail Trade and Repairs is the sector with the second largest share of domestic supply flowing to private consumption, at 72.4%. The WRT sector reflects the difference between the sale and purchase values of goods sold on imported and locally manufactured goods. It incorporates information from brokers, lottery organizers, auctioneers, and scrap dealers as well. The Wholesale and Retail Trade and Repairs sector also reports the repair of vehicles. The trade margins are also accounted for through this sector.[115] With the Wholesale and Retail Trade and Repairs sector, supplying to consumer demand is consistent with what one would expect, comprising 72.4% of its output because in aggregating the IO Table's final demand information, trade margins are completely absorbed into household consumption. But, the repair of motor vehicles would also make this sector's goods be greatly utilized by the

[113] The details on goods 17-20, 28, and 37 produced by the Export Processing Zone Manufacturing sector can be found in the 1997 Supply and Use Table in Appendix A.
[114] The examples provided are the Author's assumptions about actual consumer use.
[115] Central Statistics Office, http://ncb.intnet.mu/medrc/natacc/tabcon/part2.htm, accessed on February 26, 2003.

private consumer. Thus, the WRT sector has a large portion of its supply accounted for by private consumption.

Next, the Electricity, Gas, and Water sector supplies 72.2% of its total domestic supply to private consumption. This is understandable given that consumers use large volumes of energy, gas, and water (i.e. electricity usage, demand for desalinated water, etc.). The Other Manufacturing sector also sells a substantial portion of its wares to private consumption (66.2% of total domestic supply). As previously shown, the mixture of the goods it produced, it is obvious some of these goods are consumed by the general populous (i.e. beverages, tobacco products, paper towels, tires, glassware, etc., to name a few).[116] The EGW and the OMA sectors have a substantial part of their total domestic supply flowing to private consumption.

Lastly, the Transport, Storage, and Communication sector supplies a considerable amount of its total domestic supply to private consumers. Private consumption acquires 50.3% of its total output in 1997. Please note that in this case, transport margins are completely absorbed into household consumption. But, the domestic supply to private consumers make sense also given that land transport, water transport, air transport and travel agencies, docks and stevedoring services, and communication services are contained in the TSC sector. More specifically, buses, lorries, vans, contract cars, taxis, shipping companies, travel agencies, Air Mauritius, the Mauritius Ports Authority, the Mauritius Sugar Bulk Terminal, the Cargo Handling Authority, the General Post Office, and Mauritius Telecommunications Services are all contained in this sector. Thus, private consumers may hire taxis and contract cars for transport, use a travel agency to solidify vacation plans, fly via Air Mauritius, mail and receive mailed information through the General Post Office, and use telephone services provided through the Mauritius

[116] Examples of use are the Author's conjectures.

Telecommunication Services.[117] Therefore, the Other Agriculture, Wholesale and Retail Trade and Repairs, Electricity, Gas, and Water, Other Manufacturing, and the Transport, Storage, and Communication sectors are the sectors with the highest percentage of their total domestic supply flowing to private consumption.[118]

There are interesting attributes about the Mauritian economy concerning the gross domestic fixed capital formation as well. The Construction sector touts an investment share of 85.3% of its total domestic supply while the Other Manufacturing sector reflects a share of 49.3% of its own domestic supply. The Construction sector having such a large percentage of its total supply devoted to investment makes sense, given that construction is investment-intensive (i.e. sunk costs in constructing buildings or creating infrastructure, material costs to build – concrete, bricks, marble, stone, or to purchase machinery to lay pavement, etc.). In the case of the Other Manufacturing sector, the investment share is credible as well because building new factories, buying new equipment for production, research and development, etc. all require investment. Thus, the Construction and Other Manufacturing sectors dominate the percentage of total domestic supply devoted to gross domestic fixed capital formation.

In terms of government consumption, there is only one sector that reflects a substantial share (31.9%) of its total domestic supply flowing to government consumption, the Other Services sector. Government consumption as a percentage of total domestic supply is so prevalent in this sector because the Ministry of Agriculture, the public administration and defense department, compulsory social security services, the Ministry of Education, the Ministry

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[117] Please review Central Statistics Office, http://ncb.intent.mu/medrc/natacc/tabcon/part2.htm, accessed on February 26, 2003 for the full description of the Transport, Storage and Communication sector. The usage of the private consumer of the TSC sector's goods is the Author's conjecture.

[118] In viewing the inter-industry sales and private consumption, it is clear that the Other Agriculture sector, the Sugarcane sector, the Other Manufacturing sector, the Wholesale and Retail Trade and Repairs sector, the Electricity, Gas, and Water sector, and the Transport, Storage, and Communication sector all tend to mainly supply domestic demand.

of Health, sewage and refuse disposal, sanitation and other environmental protection services, social, recreational, and related community services are the ministries, departments, and institutions of the Government of Mauritius that are included in the Other Services sector.[119] Hence, the Other Services sector, by design, is the leading supplier of government services.

In 1997, there are three key export sectors in the Mauritian economy: the Sugar Milling sector, the Export Processing Zone Manufacturing sector, and the Restaurants and Hotels sector. In terms of the Sugar Milling sector, very little output is sold domestically, with 88.3% of total output going to exports. Of course, this directly follows from the preferential pricing sugar exports have received from the European Union and the United States being 2.44 and 1.85 times the world price of sugar in 1997.[120] Next, the Export Processing Zone Manufacturing sector boasts an 87.9% share of its total domestic supply devoted to exports of goods and services. The EPZ sector, by nature, is a sector created to bolster exports of goods and services. So, it is not strange that 87.9% of its total domestic supply was exported. The RAH sector is the third largest supplier of exports in Mauritius in 1997, in terms of its own total domestic supply, with 84.8% of total domestic supply is exported. The Restaurants and Hotels sector provides lodging, food and beverages serving services.[121] Via an e-mail correspondence, sales of tourism to foreigners coming to vacation in Mauritius are counted as the exports of services in this sector.[122] Thus, the primary exporters, as identified by the percentage of their own total domestic supply that is

[119] Please see the Other Agriculture for the General Government, Other Manufacturing for the General Government, Construction for the General Government, Other Transport, Storage, and Communication for the General Government, Other Real Estate, Renting and Business Activities for the General Government, Public Administration and Defense, Education for the General Government, Health and Social Work for the General Government, and the Other Services for the General Government columns in the 1997 Supply and Use Table found in Appendix A. The description of government services is more formally stated in http://ncb.intent.mu/medrc/natacc/tabcon/part2.htm, accessed February 26, 2003.

[120] Author's calculations from the average sugar price of the European Union, the United States, and the world price of sugar all come from the International Monetary Fund, International Financial Statistics CD-Rom, 2004.

[121] Please see Appendix A for this specification of the goods supplied by the Restaurants and Hotels sector.

[122] This information is gleaned from an e-mail correspondence with Mukesh Dawoonauth at the Central Statistics Office of the Government of Mauritius.

accounted for by exports of goods and services, are the Sugar Milling sector, followed by Export Processing Zone Manufacturing sector, and then the Restaurants and Hotels sector.

For imports of goods and services, three industries have at least 53% of their own total domestic supply comprised of imports of goods and services: the Other Manufacturing sector (156.0%); the Other Agriculture sector (74.6%); and the Export Processing Zone sector (53.7%). The Other Manufacturing sector is an import dependent sector, the highest import share of domestic supply than any other sector in 1997 of 156.0% (i.e. imports of goods and services are 1.560 times larger than its total domestic supply). In 1997, it heavily imports coke oven products; refined petroleum products; nuclear fuel (good 23); special purpose machinery (good 33); transport equipment (good 38); and meat, fish, fruit, vegetables, oils, and fats (good 11) in that order.[123] Some possible uses of such imports may be oil for factory equipment, state of the art equipment for new plants, railroad cars, etc. A considerable amount of agricultural goods are imported as well (74.6% of total supply) into the Other Agriculture sector. But, 70% of the total land under cultivation in Mauritius is under sugarcane cultivation in 1997, which would only leave 30% of cultivable land for other crop usage.[124] Thus, to meet total consumer demand, agricultural goods must be imported from abroad.

The final sector, with 53.7% of its domestic supply from imports of goods and services, is the Export Processing Zone Manufacturing sector. Please note that in the EPZ sector, there are goods imported for re-export, where Mauritius adds value to them and then ships them abroad. Also, there are considerable imported inputs used for production as well. Therefore, the Other

[123] See Appendix A.
[124] Total land under cultivation is provided by FAOSTAT data, 2005, last updated April 5, 2005 and the total land under cane cultivation is given by the Bank of Mauritius, Annual Report-Year Ended 30 June 1998.

Manufacturing sector, the Other Agriculture sector, and the Export Processing Zone Manufacturing sector have been shown to have a heavy dependence on imports.

Hence, the expenditures on gross domestic product as a percentage of total domestic demand shows the Sugarcane, Other Agriculture, Export Processing Zone Manufacturing, and the Other Manufacturing sectors have considerable inter-industry sales. Considerable domestic supply flows to private consumption in the Other Agriculture sector, the Wholesale and Retail Trade and Repairs sector, the Electricity, Gas, and Water sector, the Other Manufacturing sector, and the Transport, Storage and Communication sector, in order of magnitude. Investment, as a percentage of total supply, is dominated by the Construction sector followed by the Other Manufacturing sector. The two prominent sectors in terms of inventory adjustment, the Other Agriculture and the Other Manufacturing sectors deplete and stockpile inventories in 1997, respectively. The dominant share of total domestic supply that is consumed by the government belongs to the Other Services sector because the aggregation of all Government services is included in the OSR sector. Three sectors' goods and/or services are heavily exported: Sugar Milling, Restaurants and Hotels, and the Export Processing Zone Manufacturing sectors. Finally, with import dependence, the Other Manufacturing sector dominates in total share size, followed by the Other Agriculture sector, and then the Export Processing Zone Manufacturing sector.

2.2.1.2 Cost Structure

A similar exercise can be done with the cost structure. Several key attributes of the Mauritian economy can be viewed through the production cost assessment as a percentage of total supply for each sector. The intermediate, labor, and capital inputs, the aggregate value-

added, and the total indirect taxes net of subsidies will be displayed as a percentage of total supply. Table 5 reports the cost structure of each sector. It is as follows:

Table 5: Cost Summary of Mauritius (As a Percentage of Total Domestic Supply)[125]

Sector	Intermediate Use	Labor	Capital	Value-Added	Indirect Taxes Net of Subsidies	Total Domestic Supply
SUG	29.0	45.4	25.6	71.0	0.0	100.0
OAG	23.0	28.3	51.3	79.7	-2.7	100.0
SMI	83.4	7.0	7.5	14.5	2.1	100.0
EPZ	66.8	16.4	16.8	33.2	0.0	100.0
OMA	47.2	12.7	22.3	35.1	17.7	100.0
EGW	59.8	18.3	21.9	40.2	0.0	100.0
CON	62.7	18.5	19.6	38.2	-0.9	100.0
WRT	24.9	22.7	51.8	74.5	0.7	100.0
RAH	39.2	19.0	34.1	53.1	7.7	100.0
TSC	48.1	19.4	32.2	51.6	0.2	100.0
OSR	33.3	35.3	30.5	65.7	1.0	100.0
Total	47.5	22.1	27.2	49.3	3.2	100.0

Please note that the sector abbreviations above are as follows: Sugarcane (SUG), Other Agriculture (OAG), Sugar Milling (SMI), Export Processing Zone Manufacturing (EPZ), Other Manufacturing (OMA), Electricity, Gas and Water (EGW), Construction (CON), Wholesale and Retail Trade and Repairs (WRT), Restaurants and Hotels (RAH), Transport, Storage, and Communication (TSC), and Other Services (OSR). The column entitled "Value-Added" is included as a column to show the percentage of total costs comprised by labor and capital input usage jointly, even though it is calculated separately. Also, the indirect taxes net of subsidies negatives are maintained for addition purposes (i.e. for each sector the row totals equal 100.0%).

In reviewing Table 5, there are several characteristics displayed concerning the Mauritian economy in 1997. First, the intermediate usage cost dominates in the economy, with its share of total supply of 47.5%. Second, the capital input costs dominate labor input usage for the economy, with the percentage of total domestic supply of 27.2% and 22.1% respectively. So, Mauritius is a capital-intensive economy in 1997. Third, indirect taxes net of subsidies are all taxes on products, not including tariff revenues (the imports of goods and services are gross

[125] Author's calculations.

import tariff revenue), and subsidies comprise only 3.2% of total costs of production (total supply).

Presenting the dominant share holder of the total domestic supply, inter-industry inputs, the Sugar Milling sector, the Export Processing Zone Manufacturing sector, the Construction sector, and the Electricity, Gas, and Water sector rely heavily on intermediate inputs as a percentage of their total production cost (83.4%, 66.8%, 62.7%, and 59.8% respectively). In particular, the Input-Output Table shows that the Sugar Milling sector's inter-industry inputs primary flowed from the Sugarcane sector, which only sells into the SMI sector, and comprises 82% of its total intermediate input cost. But, this is expected given that sugarcane is the primary product used to produce sugar (raw or refined) and sugarcane is the only product of the Sugarcane sector. But, the Sugar Milling sector has 11% of its total intermediate input cost derived from the Transport, Storage and Communication sector. However, this is logical because of the usage of shipping, docks and stevedoring services by the Sugar Milling sector for export of sugar (as previously stated, 88.3% of its total domestic supply is exported in 1997).[126] Thus, the Sugar Milling sector's intermediate input usage is primarily from the Sugarcane sector followed by the Transport, Storage, and Communication sector.[127]

The EPZ sector's intermediate-input cost is dominated by its own usage. It supplies 73% of its own inputs used in production (73% of intermediate input costs). The 1997 Supply and Use Table can readily explain this through the goods usage as illustrated. The sector produces the yarn and thread that it uses in its woven and tufted textile fabrics, knitted or crocheted

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[126] Central Statistics Office, http://ncb.intent.mu/medrc/natacc/tabcon/part2.htm, accessed on February 26, 2003 shows the TSC sector's production. It is the Author's speculation on how the Transport, Storage, and Communication goods are employed by the SMI sector.

[127] See Appendix D for the 305 Rs Thousands rupees movement to the EGW sector on the TSC row of the IO Table. This amount was a hundredths of a percent discrepancy. Therefore, the share numbers across inputs adjusted very little.

fabrics, and wearing apparel.[128] The Export Processing Zone Manufacturing sector buys 22% of its inputs from the Other Manufacturing sector as well.[129] In particular, the EPZ sector buys basic chemicals and fabricated metal products, except machinery and equipment from the OMA sector. Thus, the chemicals may have been bought for the dyeing of textiles produced by the EPZ sector or zippers may have been purchased for wearing apparel, leather and leather products, or even footwear produced by the EPZ sector.[130] So, the Export Processing Zone Manufacturing sector's intermediate input cost is overwhelmingly from its intra-industry purchases, followed by the Other Manufacturing sector as a percentage of its total input costs of production.

The Construction sector's inter-industry input costs are driven by the Other Manufacturing sector in 1997. 63% of its total intermediate input costs are derived from the Other Manufacturing sector. But, stone, sand and clay flow into the Construction sector from the OMA sector (i.e. to produce concrete, asphalt, bricks, etc.). Likewise, glass and glass products as well as other non-metallic products are purchased from the Other Manufacturing sector (i.e. glass for windows). Also, basic metals are purchased from the OMA sector (i.e. aluminum for aluminum siding).[131] In addition to purchasing from the Other Manufacturing sector, the Construction sector also purchases 20% of its total inter-industry inputs from itself (i.e. builds its

[128] Please review goods 17, 18, and 19 in the Use Table in Appendix A under the Manufacturing-EPZ Manufacture of Textiles, Manufacture of Wearing Apparel, and Other columns. The usage of the goods purchased by the Export Processing Zone Manufacturing sector is the Author's conjecture.
[129] Please note that the to remove supply and demand discrepancies, 848,073 Rs Thousands is moved from the OMA column to the EPZ column and 270,617 Rs Thousands from the OAG column to the EPZ column. The discrepancy itself is only 4% of the total EPZ sector's supply in 1997. Please see Appendix D for discrepancy treatment.
[130] In Appendix A, for further detail, please review goods 24 and 31 under the Manufacturing-EPZ Manufacture of Textiles, Manufacture of Wearing Apparel, and Other columns. The actual usage of goods purchased by the EPZ sector is the Author's conjecture given that there is limited visibility into the actual usage of said goods in the industry.
[131] Please review the Construction column in the Use portion of the 1997 Supply and Use Table (Appendix A). See product lines 9, 27, and 30 specifically. As stated in the previous section, the actual usage for the goods purchased from the OMA sector is the Author's conjecture.

own office buildings, employs concrete maker to pour the foundation for masonry work to begin, etc.).[132] All in all, the majority of the intermediate input purchases for the Construction sector are from the Other Manufacturing sector, with lesser purchases from the Construction sector itself.[133]

With the Electricity, Gas and Water sector, the total intermediate input costs are dominated by the Other Manufacturing sector. 59% of the total intermediate input costs come from the Other Manufacturing sector as well. The EGW sector buys the coke oven products; refined petroleum products; nuclear fuel from the Other Manufacturing sector (i.e. oil to produce electricity). The Electricity, Gas, and Water also gleans 17.4% of its total intermediate input from the Transport, Storage and Communication sector, using its water and air services (i.e. ships to transport coal, cargo handling to process imported coal, and air travel of business executives, helicopter usage to check power lines, etc.).[134] Thus, total intermediate costs for the Electricity, Gas and Water sector is primarily derived from the Other Manufacturing sector, with some dependence on inputs from the Transport, Storage, and Communication sector as well.

On the other hand, the Sugarcane, Other Agriculture, Wholesale and Retail Trade and Repairs, and the Other Services sectors have a relatively low intermediate input cost but considerable primary input cost. Within the low intermediate input cost, but considerable

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[132] Author's conjecture concerning the actual usage of the Construction sectors own products in the Construction sector.

[133] 252,363 Rs Thousands is moved from the Construction sector column to the Electricity, Gas, and Water, Restaurants and Hotels, and Other Services sectors' columns to remove the supply and demand discrepancy, which amounted to only 2.10% of its total supply. See Appendix D for more details.

[134] The 1997 Supply and Use Table reports the specific goods' usage information for the Electricity, Gas, and Water sector. Please review product numbers 44-45 under the Electricity and Water column in the Use section of the Table. Also, to remove the discrepancies in the row and column totals of the EGW sector, 155 Rs Thousands is moved from the Sugarcane sector column and into the EGW column; 305 Rs Thousands from the Sugar Milling sector's column to the EGW column; and 1,093 Rs Thousands from the Construction column to the EGW column. This adjustment was only 0.05% of the EGW sector's total supply. Please note, the key input sector shares do not adjust the ranking of inputs (dominance of one sector over another remains the same). Please see Appendix D for further details.

primary input cost sectors, the Sugarcane and Other Services sectors are labor-intensive with 45.4% and 35.3% of production costs from labor inputs respectively, while the Other Agriculture and Wholesale and Retail Trade and Repairs sectors are capital-intensive where 51.3% of total production cost from capital inputs for the OAG sector and 51.8% for the WRT sector. In fact, three of the four high primary cost sectors are dominated by one input or the other by at least 19.8 percentage points: the Sugarcane sector is labor-intensive by 19.8 percentage points, the Other Agriculture sector is capital-intensive by 22.0 percentage points, and the Wholesale and Retail Trade and Repairs sector is capital-intensive by 29.1 percentage points, with the WRT sector having the largest factor usage percentage difference across all sectors in the economy. The Other Services sector is the only sector with a percentage margin as small as 4.7 percentage points, just making the sector slightly more labor-intensive than capital-intensive.[135] Therefore, the majority of the Sugarcane and the Other Service sectors' production costs are derived from labor inputs, whereas the majority of production costs for Other Agriculture and Wholesale and Retail Trade and Repairs are derived from capital inputs.

In terms of the indirect taxes net of subsidies, the most heavily taxed sector is the Other Manufacturing sector with 17.7% of its total production cost accounted for by indirect taxes net of subsidies in 1997.[136] The Restaurants and Hotels sector is the second most heavily taxed sector with 7.7% of its total cost incurred through taxation. Only in the Other Agriculture and the Construction sectors do subsidies outstrip indirect taxation, and hence the indirect taxes net of subsidies reflect the negative numbers of –2.7% and –0.9%. From the Computed 1997 Input-

[135] Author's calculations.

[136] Please note that indirect taxes net of subsidies might be understated due to the goods to sector matching mechanism used where the production of the good was assigned to the producer by the share of the good's total output when the good was produced by more than one producer was not applied here. For production costs, no reallocation by supply shares took place as performed in calculating the intermediate input usage and final demand totals. For further details, see Appendix D.

Output Table (see Table 3), it is evident that the Construction sector is the second most heavily subsidized sector in the economy and the Other Agriculture sector is the third most heavily subsidized sector in the economy. Hence, the Other Manufacturing sector incurs the largest indirect tax net of subsidies levies, followed by Restaurants and Hotels, with the Other Agriculture and Construction sectors incurring the least amount of indirect taxation net of subsidies as a percentage of total supply.

Therefore, in 1997, Mauritius reflects intermediate input costs as the largest share of overall production costs. Also, Mauritius is marginally more capital-intensive than labor intensive. In terms of the cost structure, the Sugar Milling, Export Processing Zone Manufacturing, Construction, and the Electricity, Gas, and Water sectors have the highest percentage of their production costs allocated to intermediate inputs. The Sugar Milling sector's usage is primarily from the Sugarcane sector and the Transport, Storage, and Communication sector. The EPZ Manufacturing sector's intermediate input costs are overwhelmingly from intra-industry input usage followed by the OMA sector. The intermediate input usage by the Construction sector flows from the Other Manufacturing sector and its own production. The Electricity, Gas, and Water sector's intermediate costs are dominated by the Other Manufacturing sector and the Transport, Storage, and Communication sector. On the other hand, Sugarcane, Other Agriculture, Wholesale and Retail Trade and Repairs, and the Other Services sectors have a high percentage of their cost driven by primary inputs. The Sugarcane and Other Services sectors are labor-intensive and the Other Agriculture and Wholesale and Retail Trade and Repairs sectors are capital-intensive in 1997. Lastly, the most heavily taxed sector is the Other Manufacturing sector, followed by the Restaurants and Hotels sector, whereas the Other Agriculture and the Construction sectors have their subsidies outstrip their indirect taxation in

1997, so they are the least heavily taxed sectors in the economy. Thus, a brief synopsis of the economy in 1997 has been established.

2.2.2 Substitution, Armington, and Transformation Elasticities

The Mauritian economy does not currently have any substitution, Armington or transformation elasticities computed.[137] More specifically, the substitution elasticities across labor types, capital and labor, imported and domestic demand, regional import sources, and the transformation elasticities between domestic and exported output as well as across regional exports have not been quantified. Since the elasticity information necessary for the study have not been computed, suitable elasticity bounds have to be employed from other studies. Therefore, this section will outline sources for the elasticity information as well as the adopted elasticities for this study.

The labor-labor substitution elasticity is needed to compute the CGE model for Mauritius. Konan and Maskus (1997, 2000) set the labor-labor substitution elasticity at 0.5 for all sectors.[138] Given that no data currently exists on labor-labor elasticity of substitution in Mauritius, I will adopt 0.50 to be conservative in this parameter.

The capital-labor substitution elasticities are needed to compute the model as well. There are several sources that I find for the capital-labor elasticity of substitution. In some cases, it is for a culmination of sectors that comprise an industry. An example of this would be the study by Yuhn (1991). Yuhn (1991) found that the elasticity of substitution between capital and labor in

[137] To ensure I was not missing any empirical evidence on elasticities, I consulted a Government of Mauritius statistician. I was informed that the elasticity information I requested did not exist, namely, the elasticities between labor types, capital and labor, imported and domestic demand, regional import sources, and the transformation elasticities from domestic supply into domestic and foreign markets had not yet been quantified.
[138] Konan and Maskus, 2000, p. 379; Maskus and Konan, 1997, p. 282.

manufacturing was 0.908 for Korea.[139] However, in other cases, the elasticity of substitution between capital and labor was given for a specific sector of an industry. This latter case is the most relevant for this study since there are 11 sectors in the Mauritius model. The Konan and Maskus (1997, 2000) model adopted the capital-labor elasticities of substitution by sector from Harrison, Jones, Kimball and Wigle (1993a). These elasticities range from 0.43 for Machinery and Transport Equipment sectors to 1.99 for Communications, Construction, Finance, etc. sectors. [140]

Another example of sector-specific capital-labor elasticities comes from the Global Trade Analysis Project (GTAP). GTAP reports its world trade model's elasticity of substitution between factors for goods and services as adopted from agriculture, manufacturing and services industries' sub-sectors. In the GTAP model, the elasticities range from 0.20 for Fishing, Forestry, Coal, Oil and Gas sectors to 1.68 for the Trade sector. For this model, the adopted elasticity of capital and labor by sector is the calculated midpoint of the range of the numbers employed by sector from the Konan and Maskus and Global Trade Analysis Project models. Table 6 presents the elasticity of substitution for the Konan and Maskus model, the GTAP model, while reporting the elasticity assignments for the Mauritian model.

[139] Yuhn, 1991, p. 343.
[140] Maskus and Konan, 1997, p. 282; Konan and Maskus, 2000, p. 379.

Table 6: Capital and Labor Substitution Elasticity Parameters by Sector

SECTORS	ELASTICITIES		
	Konan and Maskus (1997, 2000) Model	GTAP Model	YSWE Model**
AGRICULTURE			
1. Sugar	0.95	0.24	0.60
2. Other Agriculture	0.95	0.24	0.60
MANUFACTURING			
3. Sugar Milling	1.19	1.12	1.16
4. Export Processing Zone Manufacturing	1.06*	1.26*	1.17*
5. Other Manufacturing	1.19	1.26	1.23
SERVICES			
6. Electricity, Gas and Water	1.88	1.26	1.57
7. Construction	1.99	1.40	1.70
8. Wholesale and Retail Trade	1.28	1.68	1.48
9. Restaurants and Hotels	1.99	1.26	1.63
10. Transport, Storage and Communications	1.94*	1.68	1.81
11. Other Services	1.99	1.26	1.63

* Average of two numbers used to comprise the assigned sectoral elasticity for the EPZ sector (i.e. Export Processing Zone – Textiles and Export Processing Zone – Non-Textiles average elasticity computed and included here).
**Average of Konan and Maskus (1997,2000) Model and the GTAP Model.

Thus, for the 11 sectors in the Mauritius model, the range of elasticity of substitution between capital and labor is from [0.60, 1.81].

The trade elasticities are the next set of elasticities that are needed. First, the elasticity of substitution between domestic and imported goods (for both intermediates and consumption) must be parameterized. Konan and Maskus (1997, 2000) use a value of 2.0 for all sectors.[141] However, GTAP reports elasticities of substitution across domestic and imported goods that range from 1.90 to 5.20.[142] 3.55 is the midpoint of the GTAP range of substitution elasticities between domestic and imported goods. Thus, I will adopt a parameter value of 2.8 for the

[141] Maskus and Konan, 1997, p. 282; Konan and Maskus, 2000, p. 379.
[142] Dimaranan, McDougall, and Hertel, 2000, p. 19-9.

elasticity of substitution between domestic and imported goods, which is the average elasticity across the Konan and Maskus and GTAP models.

Also, the Armington substitution elasticity is needed in the Mauritian model. Konan and Maskus (1997, 2000) employ a value of 5.0 for substitution across regional imports. On the other hand, Global Trade Analysis Project specifies Armington elasticities by sector, reporting the numerical range to be [3.60, 10.40] across import regions.[143] The midpoint of the Armington elasticity range is 7.0 in the GTAP study. Lastly, Hanson, Robinson, and Tokarick (1993) report import substitution elasticities for the United States by sector where the values range from 0.2 to 5.0.[144] Thus, for the Armington substitution elasticity across regional imports, I adopt the average value of all the studies above of 4.9.

Next, the transformation elasticity between domestic and exported goods as well as the Armington transformation elasticity across regional exports are the two other elasticities that must be defined for this study as well. Konan and Maskus (1997, 2000) results are derived using 5.0 as the transformation elasticity between domestic and exported goods. Cattaneo, Hinojosa-Ojeda, and Robinson (1999) reports trade elasticities of transformation in production for Costa Rica that range from 0.30 to 6.00.[145] Aristy-Escuder (1999) reports constant elasticities of transformation across 13 sectors for the Dominican Republic which are as low as 0.2 and as high as 2.2, equating to an average elasticity of 1.2 for the economy.[146] And again, I will adopt the average across these studies for this parameter value as well. Averaging the value or midpoint range values across all studies leads to the adoption of a 3.1 assigned value for the transformation elasticity between domestic and exported goods.

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[143] Dimaranan, McDougall, and Hertel, 2000, p. 19-9.
[144] Hanson, Robinson, and Tokarick, 1993, p. 35.
[145] Catteneo, Hinojosa-Ojeda, and Robinson, 1999, pp. 50-51.
[146] Aristy-Escuder, 1999, p. 215.

Likewise, Konan and Maskus (1997, 2000) adopt a parameter value of 8.0 for the transformation elasticity between regional exports for Egypt. Harrison, Rutherford, and Tarr (2002) assume that the transformation elasticity to be about 4.0 across regional exports for Chile.[147] I will assume a rate of 6.0 for the Mauritius study.

All in all, the elasticities required for substitution across labor types is given a value of 0.5, capital and labor elasticities range from [0.60, 1.81], 2.8 is the elasticity between domestic and imported demand, and is 4.9 across regional import sources. The transformation elasticity between domestic and exported goods is 3.1, and, 6.0 is the value assigned to the transformation elasticity between regional exports.[148]

2.2.3 Other Parameters

There are a host of other parameters that are necessary to implement the model. First, the regional trade shares are needed to solve the Mauritian computable general equilibrium model. Another necessary parameter is the indirect tax net of subsidies rate by sector. Also, the value-added tax rate by sector is also needed for the model's calibration. Another set of parameters that are needed to fully calibrate the model are the tariff rates by sector. Factor endowments of labor and capital are necessary as well. The model updates, which incorporate changes in the domestic tax structure of Mauritius are also explicitly stated here, with outlined changes in the tariff rates from 1997-2000 and the introduction of the value-added tax in 1998. With the inclusion of these parameters, all of the necessary components of the model are accounted for.

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[147] Harrison, Rutherford, and Tarr, 2002, p. 56.

[148] To test the robustness of the results from this model, a systematic sensitivity analysis of the trade elasticities can be performed over a suitable range of elasticity values. However, this is reserved for future research and it is not performed in this study.

2.2.3.1 Regional Trade Shares

The regional trade shares are an integral component of the model. As previously stated, there are four regions of interest in the model, the European Union, the Southern African Customs Union, the United States, and the Rest of the World.[149] Therefore, the shares of total imports and exports are computed for these regions. The United Nations supplied the import and export data for Mauritius for 1997. Regional import and export shares by region are computed based on the data from the United Nations Commodity Trade Statistics (COMTRADE) database.[150]

Translating the United Nations' import and export data into the 11 sectors contained in the Input-Output Table to compute the regional shares takes several steps. The United Nations' 1997 data is presented in the Harmonized System Six-Digit Classification of Tariff Lines (HS96) code. However, the 1997 Supply and Use Table, and subsequently the computed 1997 Input-Output Table are reported in the International Standard Industrial Classification, Revision 3 (ISIC, Revision 3) product codes. Thus, I had to first match the ISIC, Rev. 3 codes to the HS96 tariff lines.[151] Then, based on the concordance for the ISIC, Rev. 3 product codes to the HS96 code, I matched the 3,895 imported goods and services and the 1,518 exported goods and services to their respective sectors.[152] Next, I had to aggregate the total value of imports and exports of goods and services for all ISIC, Rev. 3 codes to get total values for the sector. Then, I

[149] The European Union is defined as the conglomerate of the fifteen countries: Austria, Belgium, Denmark, Finland, France, Germany, Hellenic Republic, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom. The United States is defined by the United Nations including Puerto Rico and the Virgin Islands. And, as previously stated, the Southern African Customs Union is defined as Botswana, Lesotho, Namibia, South Africa, and Swaziland.
[150] United Nations, COMTRADE database.
[151] The concordance between ISIC, Rev. 3 to HS96 is provided by the United Nations.
[152] Please see Appendix E for the ISIC, Rev. 3 codes to the 11 sectors in the Mauritian computable general equilibrium model.

compute the aggregate value of imports of goods and services and exports of goods and services by the European Union, the Southern African Customs Union, and the United States specifically. Lastly, I had to compute share totals for the European Union, the Southern African Customs Union, the United States, and the Rest of the World over the aggregate value of each sectors' imported and exported goods and services by dividing each regions total value of imports and exports by the total value of imports and exports for the sector. Table 7 shows the listing of the 11 sectors, as grouped by agriculture, manufacturing and services, with sector shares of industry exports and imports, as well as the European Union, Southern African Customs Union, and United States shares of imports and exports by sector:

Table 7: 1997 Benchmark Trade Shares of Mauritius[153]

	M				X			
SECTOR	**Total**	**EU**	**SACU**	**U.S.**	**Total**	**EU**	**SACU**	**U.S.**
AGRICULTURE								
1. Sugarcane	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2. Other Agriculture	4.4%	14.0%	26.4%	0.6%	1.3%	45.8%	0.1%	24.0%
MANUFACTURING								
3. Sugar Milling	0.5%	10.5%	89.5%	0.0%	14.0%	95.8%	0.0%	3.6%
4. Export Processing Zone Manufacturing	22.8%	25.0%	2.7%	1.0%	44.7%	70.0%	0.4%	18.7%
5. Other Manufacturing	54.7%	39.6%	14.8%	4.0%	8.6%	46.4%	4.2%	1.7%
SERVICES								
6. Electricity, Gas and Water	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
7. Construction	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
8. Wholesale and Retail Trade and Repairs	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
9. Restaurants and Hotels	2.8%	0.0%	0.0%	0.0%	11.8%	0.0%	0.0%	0.0%
10. Transport, Storage and Communication	6.8%	0.0%	0.0%	0.0%	9.5%	0.0%	0.0%	0.0%
11. Other Services	7.9%	70.6%	3.0%	0.3%	10.0%	68.6%	0.6%	0.0%

M denotes imports and X denotes exports. The EU, SACU, and the U.S. regional share totals are computed from the UN COMTRADE database. Also, the Rest of the World (ROW) region is not included in the Table given that it is simply the remainder of trade not accounted for by the EU, SACU, and the U.S.

There are several interesting characteristics to note about Table 7. In the sectoral import share of total imports of goods and services, the Other Manufacturing sector and the Export Processing Zone sector comprise over 77% of the total imports flowing into the economy in 1997. But, as the expenditure on gross domestic product section clearly display, there is a heavy dependence on imports in the Other Manufacturing and Export Processing Zone sectors, as a percentage of their total domestic supply in 1997. Therefore, the Other Manufacturing and Export Processing Zone sectors are key importing sectors of the Mauritian economy.

[153] Author's calculations. Imports of goods and services here are reported gross of tariffs given that is what is included in the Mauritian CGE computations. For any given sector, it does not change the total import share amount by any more than 0.9 percentage points. Sugarcane, Construction and Wholesale and Retail Trade and Repairs are not imported in 1997. But, for the Restaurants and Hotels sector and the Transport, Storage, and Communication sector, 100% of the trade is allocated to the Rest of the World. On the other hand, the Sugarcane, Electricity, Gas and Water, and Construction sectors have no export volume. Therefore, there are two purely non-traded (NT) sectors, the Sugarcane and the Construction sectors.

Turning one's attention to the regional import shares by sector, the Southern African Customs Union dominates the Other Agriculture sector's imports, making up 26.4% of total import share for that sector. One reason may be due to the close proximity of the Southern African Customs Union which would cut down on transportation costs, causing their agricultural imports to be less expensive. Such dominance of the Other Agriculture sector's imports may also be explained by the faster allowance of goods on the market (i.e. a quicker turnaround time from harvesting to the consumer's table, decreasing total loss in transport from spoilage). And, the import share of the European Union and the United States seems to reflect this point, in that the European Union comprises 14.0% of total Other Agriculture imports and the United States only 0.6%. Hence, the Other Agriculture sector heavily depends on the Southern African Customs Union, and, to a lesser extent, the European Union for agricultural imports.

The Sugar Milling sector's imports are dominated by the SACU as well. This time, the SACU comprises 89.5% of its total imports. Since sugar is still an agricultural good, although isolated for this study, and all the former statements about lower transportation costs and quicker market turnaround still apply although it has a longer shelf life than some other goods. The European Union exports 10.5% of this total import volume to Mauritius. Please consider that the imported amount across both regions is very low because Mauritius produces a considerable amount of sugar for exports. Hence, this small inflow may be to bolster available supplies (i.e. for domestic sales or re-exports) or may be refined sugar. Thus, the Southern African Customs Union and the European Union are the key import regions for the Sugar Milling sector as well.

In terms of the Export Processing Zone Manufacturing sector, the European Union imports 25.0% of the total imports received by the sector in 1997. Yarn and thread; woven and tufted textile fabrics are imported as well as knitted or crocheted fabrics and wearing apparel,

with the latter three dominating the imported goods flowing into the EPZ sector. Some of the imported goods are necessary for production of textiles (i.e. yarn and thread); while others may have been further processed for consumption (i.e. knitted or crocheted fabrics made into a sweater, a scarf, etc.).[154] Therefore, for the EPZ sector, the European Union is the primary source of imported goods.

The Other Manufacturing sector's imports are dominated by the European Union, reflecting an EU import share of 39.6%. Meat, fish, fruit, vegetables, oils, and fats flow into Other Manufacturing in high volumes. Coke oven products; refined petroleum products; nuclear fuel is also a good that is imported into the OMA sector great volume. Also, special purpose machinery and transport equipment are heavily imported into the OMA sector.[155] Since the Other Manufacturing sector supplies large quantities to domestic demand, additional supplies through imported goods may have been needed to adequately satiate the domestic market, in addition to imported inputs for production. The SACU constitutes 14.8% of total imports of Other Manufacturing in 1997. Thus, the majority of Other Manufacturing's imports comes from the European Union and the Southern African Customs Union. Therefore, the Other Manufacturing sector is dependent on imported goods originating in the European Union, and to a lesser extent, in the Southern African Customs Union.

Lastly, the European Union comprises a 70.6% share of the total imports in the Other Services sector. Imports of services occur with the importation of financial intermediation, insurance, leasing and auxiliary services, and other professional, scientific, and technical services. Engineering and consulting firms may have been contracted out, banking and

[154] Author's conjecture.
[155] Appendix A provides visibility into the goods imported into the Other Manufacturing sector. Please see goods 11, 23, 33, and 38 in the Import column of the 1997 Supply and Use Table.

insurance services may have been provided, etc., to explain the imported services provided to Mauritius by the European Union.[156] Thus, the European Union is the major source of imports for the Other Services sector.

On the other hand, there are several interesting attributes concerning the export sector of the economy. First, the Export Processing Zone Manufacturing sector comprises 44.7% of total exports in the economy for 1997, far outstripping any other sector available. This is no surprise given that, by design, the EPZ Manufacturing sector is to be a key export sector as previously stated in the expenditure on gross domestic product section. However, the Sugar Milling sector is the second largest exporter in the economy supplying 14.0% of total exports in 1997. But also, as previously mentioned, 88.3% of the sector's total domestic supply is exported in 1997. Again, this result is driven by the preferential pricing agreements held with the European Union and the United States. Lastly, the Restaurants and Hotels sector exports 11.8% of the total exports of goods and services in 1997. This fact complies with the expenditure on gross domestic product where it presents the Restaurants and Hotels sector exporting a considerable amount of its total supply (84.8%) or rather tourism that it sells to foreigners is defined as an export of services in this sector.[157] Thus, in 1997, the key export sectors of Mauritius are the Export Processing Zone Manufacturing, Sugar Milling, and Restaurants and Hotels sectors.

Within the exported sectors, regional share data also provides key characteristics of the Mauritian economy as well. In the Other Agriculture sector, the European Union and the United States are key export absorbers, with a share of 69.8% of total OAG exports in 1997. In the manufacturing industry, the European Union is the single largest region of destination for

[156] Author's assumption on actual services imported.
[157] The tourism sold to foreigners being defined as exports of services is via e-mail correspondence with Mukesh Dawoonauth at the Central Statistics Office of the Government of Mauritius.

Mauritian exports across the Sugar Milling sector, the Export Processing Zone Manufacturing sector, and the Other Manufacturing sector, with 95.8%, 70.0%, and 46.4% of total exports flowing to the European Union respectively. More specifically, in 1997, the Sugar Milling sector sells most of its output to the European Union. But, this is not strange given that on average 95.34% of total sugar exports flows to the European Union in the decade of the 1990's.[158] However, the United States absorbs 3.77% of Mauritian sugar exports, bringing total absorption of sugar exports to 99.11% when combined with the European Union. And, as previously discussed, the driving force behind such lop-sided sugar export flows is the preferential pricing of 2.44 and 1.85 times the world price received for sugar exports from the European Union and the United States for that year.[159]

The key absorber of the EPZ sector's exports is the European Union. The total Export Processing Zone Manufacturing sector's exports flowing to the European Union of 70.0% is followed by the United States, with 18.7% of share of total EPZ sector's exports in 1997. Thus, in 1997, the European Union and the United States are the dominant export absorption regions for Mauritius' Export Processing Zone Manufacturing sector.

For the services industry, the Other Services sector is the only sector for which either the EU, SACU, or the U.S. regions are non-zero.[160] But, the European Union is the only region with a substantial share of the OSR sector's total exports, accounting for 68.6% of the total exports in that sector. The 1997 Supply and Use Table clearly outlines that the exported services are: financial intermediation, insurance, leasing and auxiliary services (good 48); other professional,

[158] The regional shares of the total exports by sector are the Author's calculation from the Bank of Mauritius, Annual Reports-Various Years, sugar production and exports trend data.
[159] The prices in excess of the world price are Author's calculations from the International Monetary Fund, International Financial Statistics CD-Rom, 2004.
[160] The Restaurants and Hotels sector as well as the Transport, Storage and Communication sector have positive import amounts, but it is all attributed to the Rest of the World given the U.N. COMTRADE Data did not report exports for either the European Union, the Southern African Customs Union, or the United States in 1997.

scientific, and technical services (good 51); public administration and other services to the community as a whole (good 56); and recreational, cultural, sporting or other services (good 61).[161] Hence, the European Union is the key export region for the Other Services sector.

In conclusion, the key import sectors are both in the manufacturing industry, the Other Manufacturing sector and the Export Processing Zone Manufacturing sector. And, when reviewing the regional shares for the sectors, the Southern African Customs Union is the key import region for the Other Agriculture and the Sugar Milling sectors. The European Union also makes up a substantial share of the Sugar Milling sector's imports. However, the European Union is the dominant importer for the Export Processing Zone Manufacturing, Other Manufacturing, and the Other Services sectors. But, the Southern African Customs Union does constitute a sizable share of total Other Manufacturing imports as well. Therefore, the European Union and the Southern African Customs Union are the key import sources of origin for the Mauritian economy. In exports, the dominant export sectors are the Export Processing Zone Manufacturing, the Sugar Milling, and the Restaurants and Hotels sectors. Within the regional share data, the European Union is clearly the largest export recipient for the Other Agriculture sector, the Sugar Milling sector, the Export Processing Zone Manufacturing sector, the Other Manufacturing sector, and the Other Services sector. However, the United States absorbs a considerable amount of Mauritius' exports in the Other Agriculture sector as well as in the Export Processing Zone Manufacturing sector. Hence, the European Union and the United States are both major outlets for Mauritian exported goods.

[161] See Appendix A.

2.2.3.2 Indirect Taxes Net of Subsidies Rates

The indirect taxes net of subsidies rates are also a needed component of the Mauritian model. It is implicitly computed within the model based on the total indirect taxes by sector, exclusive of tariff revenues.[162] The indirect taxes net of subsidies is defined as the difference of total indirect taxes, not including tariff revenues, plus subsidies, divided by the total domestic supply. The tax rate values range from [-2.7%, 17.7%] for 1997 as seen in Table 5. Without import revenues being included here, the Other Agriculture sector has no other taxes levied on it and it is also subsidized (the only sector with a mixture like this) and hence has an indirect taxes net of subsidies rate of

–2.7% of total supply costs (all subsidy). However, the Other Manufacturing sector incurs a substantial amount of total indirect taxation sans import revenues, while receiving a small subsidy.[163] Hence, it reflects the 17.7% indirect tax rate net of subsidies. Thus, indirect taxes net of subsidies are employed in the model.

2.2.3.3 Value-Added Tax Rates

The value-added tax rates by sector are pertinent in solving the computable general equilibrium model for Mauritius. The value-added tax rates are important concerning the adoption of other policy changes that occurred from 1997-2000, with 2000 being the year chosen because of the natural "break" in the preferential pricing agreements for sugar. Thus, it is

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[162] Imports of goods and services are gross of import revenues in the model and therefore the tariff revenues are not included in the indirect taxes net of subsidies total.

[163] Please see the 1997 Input-Output Table's Taxes on Products row versus the Subsidies on Products row by sector. Other Agriculture has a zero taxes on products (not including the import revenues) and receives the third largest subsidization in 1997 of 14% of the total subsidies issued. However, quite the opposite holds for the Other Manufacturing sector. It comprises 77% of the total taxes on products. And, even though it receives the largest share of total subsidies of 57%, the 4.4 Rs Thousands that it pays in taxes swamps the 0.4 Rs Thousands in subsidies it receives.

incorporated into the counterfactual simulation that is run on the 1997 base. Since the Mauritian government did implement the value-added tax, the 2000 value-added tax rates are needed to reflect this domestic policy change of the tax structure.

The value-added tax was introduced September 7, 1998 to replace the sales tax on goods. The value-added tax rate was 10% on the supply of goods and services in Mauritius, chargeable on the value of supply. This tax is also levied on the importation of goods into Mauritius.[164] Thus, in 1997, the sales tax of 8% was in effect. But, in 2000, the official value-added tax rate of 10% was in effect. However, several goods and services are exempted from the value-added tax.[165] The main items exempted from the value-added tax are the basic foodstuffs like rice, flour, fish, meat and vegetables, medicines and medical services, herbicides, educational and training services, journals and periodicals, aircrafts, ships and fishing vessels, financial services, transport of passengers by sea or air, sale or transfer of interest in land liable to Registration Duty, and the sale, construction and renting of buildings for residential purposes.[166] As a result, the imposition of the official tax rate was 10% in 1997, but due to exemptions within certain sectors, the effective rates are not uniform across sectors.

The value-added tax data is provided by the Value-Added Tax Department and the Central Statistics Office of the Government of Mauritius. In particular, the 2000 value-added tax revenue database was sent to me via e-mail by the Customs and Excise Department of the Government of Mauritius. A total of 4,328 records are in this database. Like the import and export data, the data is reported in the HS96 tariff line coding, even though the Supply and Use Table is characterized by the ISIC, Rev. 3 product code. So, again applying the ISIC, Rev. 3 and

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[164] This is information gathered through correspondence with the Value-Added Tax Department of the Ministry of Finance.
[165] See Appendix F for the detailed value-added tax exemption list.
[166] Ministry of Finance, http://ncb.intnet.mu/mof/department/vat/about.htm, accessed April 19, 2002.

HS96 correspondence as in the regional share calculations, I assigned the 4,328 records to the 11 sectors in the CGE model with exemptions included.[167] In this case though, the zero values of the value-added tax are applied to exempted goods and services and a rate of 10% to all other goods. Then, the aggregate of the total number of goods with a zero value-added tax rate and the total number of goods that have the official 10% rate applied to them are divided by that total number of goods assigned to that sector to get the value-added tax rate for that sector (0 records assigned to SUG; 210 records assigned to OAG; 4 records assigned to SMI; 1,120 records assigned to EPZ; 2,981 records assigned to OMA; 1 record assigned to EGW; and 12 records assigned to OSR). Table 8 reflects the average value-added tax rates computed for each sector in 2000 using the methodology outlined above:

Table 8: 2000 Value-Added Tax Rates by Sector (Percentage)

Sector	Value-Added Tax Rates
Sugarcane	0.00%
Other Agriculture	3.52%
Sugar Milling	10.00%
Export Processing Zone Manufacturing	9.37%
Other Manufacturing	9.50%
Electricity, Gas, and Water	10.00%
Construction	0.00%
Wholesale and Retail Trade and Repairs	0.00%
Restaurants and Hotels	0.00%
Transport, Storage and Communications	0.00%
Other Services	5.83%

As a result of the exemptions valid in 2000, the Other Agriculture and the Other Services sectors have non-zero value-added tax rates well below the official rate. In fact, only two sectors reflect

[167] For 2000, the exemptions were accounted for in the data with The Value Added Tax: Goods and Services Exempted from VAT, 1 September 1999 pamphlet.

the official value-added tax rate in 1997, the Sugar Milling sector and the Electricity, Gas, and Water sector. Therefore, the value-added tax rates are not uniform across sectors due to the exemptions afforded to certain sectors, and since the value-added tax is applied in a non-uniform manner, it is a distortionary tax in the Mauritian economy.

2.2.3.4 Tariff Rates

Another set of parameters that must be specified is the tariff rates by sector. To calibrate the initial benchmark year, the 1997 tariff rates by sector are needed. However, to perform the policy updates of tariff rate changes from 1997-2000, the changes that took place during that time period are needed to adequately update them to their 2000 rate structure. Since the tariff rates by goods are not explicitly available, I compile tariff rates data for 1997-2000 as follows. The tariff rate data comes from two sources, both of which were supplied by the Ministry of Finance of the Government of Mauritius. The first source was a document entitled "List of Items on Which Customs Duty Has Been Reduced," which provides, in the HS96 code, the tariff rates by good for the 1998-1999 fiscal year (1,184 records).[168] The other source was a document entitled "List of Tariff Changes Budget 99/00" that supplies the FY 1999/00 rates (511 records).[169] Since no overlap existed across the two documents, a total of 1,695 records were used to calculate the average tariff rates by sector.

These 1,695 records are reported in the Harmonized System Six-Digit classification of tariff lines code (HS96). Since the 1997 defined sectors are compliant with the International Standard of Industrial Classification, Revision 3 (ISIC, Rev. 3), there are a few steps to matching the tariff lines for goods to the 1997 basis. As in the import and export data aggregation, I have

[168] Ministry of Finance, http://ncb.intnet.mu/mof/budget/19981999/tariff.doc, accessed February 10, 2003.
[169] Ministry of Finance, http://ncb.intnet.mu/mof/budget/19992000/index.html, accessed February 10, 2003.

to translate the HS96 code into the ISIC, Rev. 3 code. Thus, it was necessary to aggregate the HS96 tariff lines in accordance to the Input-Output basis for 1997. There are two columns in each document, one that reflects the existing tariff rate and the other that reflects the new rate by good. For 1997, the average tariff rates by sector are calculated by first applying the tariff rates recorded in the "Existing Rates" columns to each sector, aggregating them, and then taking the average across those assigned rates to obtain the average tariff rate by sector. However, the 2000 average tariff rates are calculated by taking the "New Rate" columns' reported rates, and, averaging over those rates in each sector after they are assigned to each sector. The exercises outlined above yield the following rates by year as found in 1997 and 2000 for Mauritius in Table 9:

Table 9: 1997 and 2000 Average Tariff Rates by Sector (Percentage)

Sectors	1997 Average Tariff Rates	2000 Average Tariff Rates
Sugarcane	0.00%	0.00%
Other Agriculture	9.49%	9.77%
Sugar Milling	8.72%	10.00%
Export Processing Zone Manufacturing	11.97%	2.91%
Other Manufacturing	12.37%	7.60%
Electricity, Gas, and Water	11.62%	10.00%
Construction	0.00%	0.00%
Wholesale and Retail Trade and Repairs	0.00%	0.00%
Restaurants and Hotels	0.00%	0.00%
Transport, Storage and Communication	0.00%	0.00%
Other Services	8.72%	10.00%

Please note that the actual tariff rates in 1997 were scaled down by 42% to match the total import duty collection in 1997 of 6,157 Rs Thousands. However, the 2000 rates are not scaled given the

imports of goods and services by sector are not available for that year, thus an overstatement or understatement of average rates may exist for year 2000.

2.2.3.5 Factor Endowments

The factor endowments are an equally important part of the Mauritian computable general equilibrium model's computation. First, there are three primary inputs explicitly defined in the model, skilled labor, unskilled labor, and capital. The data for aggregate labor and capital is supplied through an e-mail correspondence with the Central Statistics Office of the Government of Mauritius.[170] The e-mail provides the compensation of employees and the gross operating surplus by economic activity. Further aggregation of these reported numbers led to obtaining the compensation of employees and the gross operating surplus by sectors.

However, to obtain the labor disaggregation of skilled and unskilled workers, the 2000 Population Census is employed.[171] Given the disaggregation is typically based on wage income, I choose this methodology as well. Since wage data across the 11 sectors outlined in the Mauritian economy is not available, I had to compile it. First, to obtain the mixture of skilled and unskilled laborers for the model, I had to calculate the shares by labor types for the specified industries listed in the Census Report. There are eight major occupational groups and 14

[170] The data comes from an e-mail correspondence with Mukesh Dawoonauth at the Central Statistics Office of the Government of Mauritius. Table 1.15 – Production and Generation of Income Accounts by Kind of Economic Activity, 1997-1999, supplies the compensation of employees and gross operating surplus for 1997. Further aggregation by sector occurs to match what was presented in Table 1.15 with the 11 sectors of the 1997 Input-Output Table computed by the Author. For further details, see Appendix D.

[171] From an e-mail correspondence with Mukesh Dawoonauth at the Central Statistics Office of the Government of Mauritius, I was alerted that the population census would have occupational data, but that it was only given every 10 years. So, I picked the 2000 Population Census for this study given that the benchmark year for this study is 1997, assuming that the occupational mix of employees and incomes would be the same in 1997 as it was in 2000.

industries found in Table CA13-Current Employed Population 12 Years of Age and Over by Industry (Section), Major Occupational Group and Sex.[172]

Once the labor share by industry groupings is calculated, the earnings by labor type have to be calculated. Table CA30 – Currently Employed Population 12 Years of Age and Over by Income Received for the Month of June 2000, Major Occupational Group and Sex reports the total income received for the month in increments (i.e. Less Than 1,000, 1,000 – 1,499, …, Greater Than 30,000 rupees) supplies the total income across the various occupational types. So, I first augment the total number of laborers assuming the share of laborers by occupation types remained constant, adding the "Not Stated" laborers to the income ranges by share of total laborers in that income range. Then, I calculate, using the midpoint of the income ranges, the total income by occupation. Next, I calculate the weighted average of incomes by occupational group, yielding the monthly wage. The yearly wage by occupational groups is then calculated assuming the same monthly wage across all months.

After I compute the yearly incomes by sector for each occupational group, I had to calculate the skilled and unskilled share of total income for the year. Skilled laborer groupings are determined by the percentage of laborers with some college or higher educational attainment. I divide the sum of skilled labor income by total income for that year (i.e. Legislator, Senior Officials, and Managers; Professionals; Technicians and Associate Professionals; and Clerks) across all sectors. Likewise, to compute the unskilled share of total income, I divide the sum of

[172] The major occupational groups are Legislators, Senior Officials and Managers; Professionals; Technicians and Associate Professionals; Clerks; Service Workers and Shop Sales Workers; Skilled Agricultural and Fishery Workers; Craft and Related Trades Workers; Plant and Machine Operators and Assemblers; and Elementary Occupations and the industry grouping includes Agriculture, Hunting, Forestry, and Fishing; Mining and Quarrying; Manufacturing; Electricity, Gas, and Water; Construction; Wholesale and Retail Trade, Repair of Motor Vehicles and Personal and Household Goods; Hotels and Restaurants; Transport, Storage and Communications; Financial Intermediation; Real Estate, Renting and Business Activities; Public Administration and Defense, Compulsory Social Security; Education; Health and Social Work; and Other Services. The information comes from http://ncb.intnet.mu/cso/report/hpcen00/econo/ca13repb.htm, accessed April 10, 2003.

unskilled labor income by the total income for that year (i.e. Service Workers and Shop Sales Workers; Skilled Agricultural and Fishery Workers; Craft and Related Trades Workers; Plant and Machine Operators and Assemblers; and Elementary Occupations). Lastly, the sectoral aggregation that matches the Mauritius model was implemented, causing the skilled and unskilled share by sector to range from 9.34% to 70.89% percent for skilled workers and 29.11% - 90.66% for unskilled workers.[173] Table 10 represents the labor share data which calibrates 1997.

Table 10: Skilled and Unskilled Labor Shares by Sector (Percentage)

Sector	Skilled Labor Share of Total Labor	Unskilled Labor Share of Total Labor
Sugarcane	9.34%	90.66%
Other Agriculture	9.34%	90.66%
Sugar Milling	23.24%	76.76%
Export Processing Zone	23.24%	76.76%
Other Manufacturing	23.24%	76.76%
Electricity, Gas, and Water	60.47%	39.53%
Construction	14.70%	85.30%
Wholesale and Retail Trade and Repairs	39.29%	60.71%
Restaurants and Hotels	36.36%	63.64%
Transport, Storage, and Communication	44.76%	55.24%
Other Services	70.89%	29.11%

As evidenced by Table 10, the Electricity, Gas, and Water and Other Services sectors' labor input is primarily skilled. Meanwhile, the Sugarcane, Other Agriculture, Sugar Milling, Export

[173] The Sugarcane and Other Agriculture sectors' labor shares are adopted from the labor shares found for the Agriculture, Hunting, Forestry, and Fishing sector. The Sugar Milling, Export Processing Zone Manufacturing, and the Other Manufacturing sectors are represented by the labor share numbers' computation from the aggregate of the Mining and Quarrying and the Manufacturing columns. Also, the Other Services sector's share numbers are computed after aggregating the Financial Intermediation; Real Estate, Renting, and Business Activities; Public Administration and Defense, Compulsory Social Security; Education; Health and Social Work, and the Other Services columns together.

Processing Zone Manufacturing, Construction, Restaurants and Hotels, and the Transport, Storage, and Communication sectors' labor is largely unskilled. Therefore, the majority of the sectors in the Mauritian economy employ more unskilled laborers than skilled laborers.

2.2.3.6 Model Updates

Prior to performing any of the simulations for potential sugar and tariff reforms, the Mauritian model has been updated to include changes in the tariff rates and implementation of the value-added tax. In terms of the tariff rates, they adjust to where the majority of the sectors experienced tariff liberalization during the period from 1997 and 2000 (see Table 9). The new tariff rates for 2000 are applied as well. Lastly, the domestic policy changes, such that the value-added tax was implemented in 1998. Given the natural break in the trade agreements was 2000, the 2000 value-added tax rates is adjusted to be consistent with the real value of the 1997 government budget deficit, maintaining the indirect taxes net of subsidies rates. Either the value-added tax or the lump-sum tax is scaled proportionately to ensure that revenue neutrality for the policy changes: sugar price cuts (EU, U.S., and the EU and the U.S. jointly) and the sugar price cuts and unilateral tariff liberalization (EU, SACU, the U.S. and the SACU jointly, and tariff liberalization with all of its trade partners) concurrently because the assumption is made that government consumption remains the same despite the policy that is imposed.[174]

Chapter 3 will address the economy-wide effects of the sugar price cuts to the world price for the European Union and the United States. The simulation results will be introduced for each policy change separately and then jointly. The analysis will also be presented at that time.

[174] The regional order for the sugar price cuts simply reflects the dominant absorber of sugar exports from Mauritius first, the European Union, followed by the residual customer for sugar exports, the United States. The listed order the regions reflect the order of importance in the import volumes flowing into Mauritius when dealing with import tariff liberalizations. Only liberalization with the EU alone, SACU alone, U.S. and SACU jointly, and with all trade partners will be discussed because these trade agreements would reflect the policy changes that are most likely to be made.

3.0 CHAPTER 3

One of the key challenges facing the Mauritian economy is the loss of its preferential pricing for sugar exports with the European Union and potentially with the United States as well. This chapter will display the economy-wide effects of the decrease in the Mauritian sugar pricing for the European Union and the United States separately and then jointly. The first section will supply the equations affected by the terms of trade change(s). Section 2 will discuss the economic effects of the 59% reduction in the price of sugar exports flowing to the European Union. The next section will present the reverberations in the economy from the removal of the preferential pricing received from the United States for Mauritius' sugar exports, which equates to a 45% decrease in the sugar export price by the U.S. Then, the results from the joint loss of preferential pricing for sugar exports flowing to the European Union and the United States will be described in Section 4. Lastly, in Section 5, the conclusions of Chapter 4 will be presented. In essence, the effects of the sugar export price changes on the Mauritian economy as a whole, as captured through the CGE for Mauritius, are the focus of this chapter.

3.1 AFFECTED EQUATIONS

With sugar price changes, there is a terms of trade effect that will ripple throughout the Mauritian economy. The sugar export price changes will affect several equations directly,

namely the producer price of exported goods, the current-account imbalance, and the zero profit condition because it is explicitly included as a variable in these equations.[175] Hence, several equations will be directly impacted by the sugar export price change.

The most obvious equation that will be affected with a terms of trade change is the producer price of exports. As previously stated in Chapter 2, the producer price of exports is defined as stated in equation (24)

(24) $p_{ri} = p_{ri}^{x} \ \forall$ r = 1, 2, …, 4 and i = 1, 2, …, 11.

For the export price changes, the price of exports in region r or rather, p_{ri}^{x}, changes. Please note that r = 1 and 2 representing the United States and the European Union regions respectively, and i = 3 for the Sugar Milling sector, the sector which exports sugar in the Mauritian economy. When the sugar price change for the EU is considered alone, the export price for sugar is adjusted downward from 2.44 to one for the EU only, or rather $p_{EU,SMI}^{x}$ is set to one to reflect the removal of the Sugar Protocol price paid for sugar exports and the adoption of the world price by the European Union. Similarly, $p_{US,SMI}^{x}$ is set to one when simulating the preferential price of sugar exports paid by the United States falling from 1.85 to the world price of one. Lastly, both $p_{EU,SMI}^{x}$ and $p_{US,SMI}^{x}$ are set to one from their initial values to represent the joint removal of preferential pricing for sugar exports flowing to the European Union and the United States. Therefore, this equation experiences downward adjustments in the Sugar Milling sector when the price paid for Mauritius' sugar export is cut for the European Union, the United States, or the European Union and United States concurrently.

[175] Due to the nature of the computable general equilibrium model, the changes of one parameter or variable can affect every variable in the model, however, this section will only address those equations where the export price is explicitly stated in its equation.

The current-account imbalance (deficit) is directly dependent on sugar export prices as well. As given in Chapter 2, the current-account deficit is defined as:

(14) $B = \sum_r \sum_i \left(\frac{1}{e}\right)\left(p_{ri}^m M_{ri} - p_{ri}^x X_{ri}\right)$ for all r = 1, …, 4 and i = 1, …, 11.

Since the current-account imbalance is directly dependent on sugar export prices, the total export value, $p_{ri}^x X_{ri}$, changes because $p_{r,SMI}^x$ is moving. However, X_{ri}, the export of good i to region r, will adjust as well, causing the export value to change (i.e. a key export sector's output decreases causing its total export quantity to fall for that sector). Furthermore, adjustments occur in the total import value, $p_{ri}^m M_{ri}$, given that changes in p_{ri}^m occur from changing of the value-added tax rates in the value-added tax replacement and changes in the import quantities M_{ri} are generated in the economy as well because increases or decreases in the output volumes in an importing sector will increase or decrease the M_{ri} for that sector. Thus, the real foreign exchange rate, based on these changes, will adjust to maintain a constant current-account imbalance. In particular, e will have to increase or decrease based on the change in the import and export values, or rather $\Delta p_{ri}^m M_{ri}$ and $\Delta p_{ri}^x X_{ri}$. The real foreign exchange rate e may decrease (increase) and this denotes an appreciation (a depreciation) in the rupee since e is defined as rupee per foreign currency. Hence, the real exchange rate movement is ambiguous because it is contingent on the subsequent import and export value changes produced from the change in the price(s) gleaned for sugar exports.

Likewise, the zero profit condition is directly dependent on the export price of sugar. The zero profit condition, or equation (17), is

(17) $p_i D_i + \sum_r p_{ri}^x X_{ri} = c_i Y_i$ for all i .

The falling sugar export price will decrease the export sales value $\sum_r p_{ri}^x X_{ri}$ for the Sugar Milling sector. But, it is unclear the extent that total output will fall due to the sugar export price cut. However, X_{ri} may increase or decrease for other sectors. And, with the other sectors, it is also ambiguous whether output will rise or fall, increasing (decreasing) the total cost of production (term $c_i Y_i$) and/or that an increase (decrease) in the domestic sales value will occur (term $p_i D_i$). Therefore, the zero profit condition adjusts and is dependent on export and output quantity movements resulting from the change in the sugar export price(s) in addition to the $p_{r,SMI}^x$ changes that occur.

All in all, the producer price of exported goods, the current-account deficit, and the zero profit condition are directly affected by the change in the sugar export price by the EU, the U.S, in isolation or jointly. The producer price of exports falls for the Sugar Milling sector. However, the real foreign exchange rate movement is ambiguous because it is determined by the aggregate movement of import and export values. Lastly, the zero profit condition is forced to adjust via the total export quantity, output quantity, and export price changes.

3.2 59% MAURITIUS SUGAR EXPORT PRICE REDUCTION BY THE EUROPEAN UNION

There are several reverberations through the Mauritian economy based on the repeal of the Sugar Protocol by the European Union. The sugar export price change here, as derived through the decrease of the price the European Union pays the Sugar Milling sector for sugar exports from 2.44 to the world price of one, will change output, export, and import quantities by sector,

will yield welfare effects, changes in the foreign exchange rate, will cause the replacement tax, either the value-added tax rate or lump-sum tax, to vary, and will induce factor price changes.[176] Each of these variables will characterize the economic effects experienced as a result of Mauritius losing the preferential sugar export price it gleans from the European Union.

3.2.1 Economic Effects of the Mauritius Sugar Export Price Reduction by the European Union on Output Volumes by Sector

The first variable that will be addressed is the output quantity by sector that is affected by the reduction in the EU purchase price for Mauritius' sugar exports. Table 11 details the shifts in production that occur from Mauritius losing its preferential price for sugar exports as paid by the European Union with value-added and lump-sum tax replacement. Table 11 is as follows:

[176] All percentage changes are from the updated benchmark economy, or the updated benchmark, which is inclusive of the tariff changes that occur from 1997-2000 and the introduction of the value-added tax in 1998, with constant indirect taxes net of subsidies rates.

Table 11: Economic Effects of the European Union Sugar Price Reduction on Output Quantity by Sector (Percentage Change from Updated Benchmark Except the Updated Benchmark Output Quantities)[177]

Variables	Updated Benchmark Output Quantities (Billions of Rupees)	59% Decrease in Sugar Export Price of the European Union with Value-Added Tax Replacement	59% Decrease in Sugar Export Price of the European Union with Lump-Sum Tax Replacement
Sugarcane	1.709	-62.41	-62.52
Other Agriculture	3.207	1.36	1.21
Sugar Milling	1.409	-58.98	-59.10
Export Processing Zone Manufacturing	65.795	6.25	5.96
Other Manufacturing	19.616	0.42	0.09
Electricity, Gas, and Water	2.887	0.51	-0.27
Construction	11.721	-0.02	-0.02
Wholesale and Retail Trade and Repairs	13.300	-1.14	-0.41
Restaurants and Hotels	1.981	-2.10	-1.63
Transport, Storage, and Communication	13.878	-2.48	-1.93
Other Services	30.692	-0.67	-0.74
Total	166.195	n.a.	n.a.

n.a. denotes 'not applicable.'

[177] The output quantities by sector for the updated benchmark are from the simulation results and will only be reported in this table. Please refer to this table for the output quantities hereafter.

There are several things that are evident from this table. First, the sectors that experience increased output with the value-added tax replacement are the Other Agriculture (1.36%), Other Manufacturing (0.42%), Export Processing Zone Manufacturing (6.25%), and the Electricity, Gas, and Water (0.51%) sectors, while in the lump-sum tax replacement the output volumes expand in the Other Agriculture (1.21%), Export Processing Zone Manufacturing (5.96%), and the Other Manufacturing (0.09%) sectors.[178] Of these sectors, the percentage increases in the Export Processing Zone Manufacturing sector as well as in the Other Agriculture sector are the most prominent. But, the only percentage changes that produce a notable increase in the output volume occur in the EPZ sector, producing a 4.1 and 3.9 billion rupees difference in absolute terms for the value-added and lump-sum tax replacement respectively.[179] The percentage changes in the Export Processing Zone Manufacturing sector for the value-added and lump-sum tax replacement are significant because the sector is 39.59% of the total output quantity for the updated benchmark, which is the largest share of output volume for any sector in the updated economy.[180] The percentage increases applied to the large base quantity of the Export Processing Zone Manufacturing sector far outstrips the other sectors' absolute output quantity increases, where the changes outside of the EPZ sector are only 3.43% in the value-added tax replacement and 1.45% in the lump-sum tax replacement of the total absolute output quantity changes that occur in the EPZ sector. Thus, I will only address the EPZ sector's change. The relative wage of unskilled labor increasing by less than the skilled labor wage or the rental rate of capital would cause this sector's output to increase because it is the largest consumer of unskilled labor in the updated benchmark, accounting for 40.20% of the total unskilled labor demand (see

[178] The percentage change in the output quantities are in parenthesis.
[179] The difference is the Author's calculations from the simulated results.
[180] The share of the total output quantity is the Author's calculations from the simulation results.

Section 3.2.5).[181] Also, the increase in the OMA sector's output, the industry with the next largest demand for the Export Processing Zone Manufacturing sector's inter-industry output at 6.55% of its total inter-industry demand, would bolster the EPZ sector's output as well (see Section 2.2.1.). Furthermore, the foreign exchange devaluation will favor the sector as well given that it is one of the main exporting sectors in the economy (please refer to section 3.2.4.). Lastly, the value-added tax decrease will also cause the Export Processing Zone Manufacturing sector's production costs to fall because it has a levy of 9.37%, one of the highest in the economy, which would thereby increase its output volume (see Table 8 and Section 3.2.4.). All in all, the Export Processing Zone Manufacturing sector has the substantial increases in its output volume, largely due to smaller relative wage increases in the unskilled labor, increases in the output volume of the Other Manufacturing sector, foreign exchange devaluation, and the value-added tax decrease.

On the other hand, the sectors that suffer decreases in their output quantities with the value-added tax replacement are the Sugarcane, Sugar Milling, Construction, Wholesale and Retail Trade and Repairs, Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors, but with the lump-sum tax replacement all the same sectors of decline apply as in the value-added replacement scenario, but with the addition of the Electricity, Gas, and Water sector. However, the largest percentage contractions exist in the Sugarcane sector and the Sugar Milling sector, regardless of the tax replacement employed. For the Sugarcane sector, the output volumes contracts sharply, exhibiting a –62.41% decrease in the value-added tax case and a –58.98% decrease in the lump-sum tax case. Here, the largest percentage decrease translates into about a 1.1 billion rupees decrease for both the value-added and lump-sum tax

[181] The share of unskilled labor demand is the Author's calculation from the simulation results.

replacements and are the largest absolute decreases that occurs in the economy.[182] The non-traded Sugarcane sector's goods are solely tied to the Sugar Milling sector and it bears the brunt of the output quantity contractions in the economy. This sector experiences the largest contraction because it only supplies its output to the Sugar Milling sector, so with large decreases in production for its sole customer (to be discussed below), the output in this sector falls about the same amount as the Sugar Milling sector.

And, for obvious reasons, the output quantities of the Sugar Milling sector decline by a large percentage amount for the value-added tax and lump-sum tax replacement, with decreases of -58.98% and -59.10% respectively. The sector, which exports 97.72% of its total production in 1997, loses its preferential price for sugar exports as paid by its largest export consumer, the European Union, a consumer that absorbs 95.34% of its total sugar exports in that same year.[183] In the value-added tax replacement case, the percentage decrease translates into -831 million rupees output contraction and in the lump-sum tax case the percentage decrease produces an -833 million rupees decline in output volume.[184] Such a stark decrease in output quantities suggests a high output price elasticity of sugar similar to the Taylor, Yúnez-Naude, and Hampton (1999) CGE study of price liberalization of maize in Mexico.[185] Also, as evidenced by a computable general equilibrium study by Nielsen (2003), the removal of the preferential agreement for paddy and processed rice causes beneficiaries of the agreement to decrease production of paddy and processed rice.[186] Thus, there is support given of the importance to the preferential pricing agreement and the volume of sugar production. Thus, the output volume decreases in the Sugar

[182] The difference is the Author's calculations from the simulated output quantity results.
[183] The share of total sugar production and share of total sugar exports by region are the Author's calculation from the Bank of Mauritius, 1998, p. 27.
[184] The quantity decrease is the Author's calculations from the simulation results.
[185] Taylor, Yúnez-Naude, and Hampton, 1999, p. 463.
[186] Nielsen, 2003, p. 21.

Milling sector are not strange given that it may reflect a high output price elasticity and that the removal of preferential agreements can depress output volumes of goods covered by them.

In conclusion, the output quantities percentages increase most notably for the Other Agriculture and Export Processing Zone Manufacturing sectors across both replacement tax options. But, the only significant absolute output volume change is in the EPZ sector due to the relative wage of the unskilled labor rising by less than either the skilled labor wage or the rental rate of capital, the increase in the Other Manufacturing sector's output volume, the depreciation of the rupee, and the decrease in the value-added tax rates. However, the sharpest declines in output volumes occur in the Sugarcane and Sugar Milling sectors, irrespective to which tax replacement option is chosen, in both percentage and absolute terms, largely because the Sugarcane sector's sole customer is the Sugar Milling sector and the Sugar Milling sector loses its preferential price for its sugar exports and actually exports a substantial amount of its production.

3.2.2 Economic Effects of the Mauritius Sugar Export Price Reduction by the European Union on Export Volumes by Sector

A trade variable that is affected by the 59% price reduction in sugar export by the European Union is the export quantity. In Table 12, the export volume adjustments are reported for every sector that has positive export volumes in 1997 for both value-added and lump-sum tax replacement.

Table 12: Economic Effects of the European Union Sugar Price Reduction on Export Quantity by Sector (Percentage Change from Updated Benchmark Except the Updated Benchmark Output Quantities)[187]

Sectors*	Updated Benchmark Export Quantities (Billions of Rupees)	59% Decrease in Sugar Export Price of the European Union with Value-Added Tax Replacement	59% Decrease in Sugar Export Price of the European Union with Lump-Sum Tax Replacement
Other Agriculture	0.484	1.42	1.25
Sugar Milling	0.721	-91.01	-91.03
Export Processing Zone Manufacturing	59.247	6.30	6.00
Other Manufacturing	3.567	-0.08	-0.42
Electricity, Gas, and Water	0.001	0.33	-0.49
Wholesale and Retail Trade and Repairs	0.039	-1.32	-0.65
Restaurants and Hotels	1.403	-2.22	-1.78
Transport, Storage, and Communication	3.553	-2.64	-2.14
Other Services	4.175	-0.91	-1.04
Total	73.190	n.a.	n.a.

*Only the sectors with positive export volumes are recorded in this table. Therefore, the Sugarcane and the Construction sectors are not included here. Also, the Electricity, Gas, and Water sector would not have any positive export volume had it not been assigned an amount through the application of the calculated supply shares to the exports of goods and services, a mechanism which is applied to usage values to ensure the share of production of a composite good is assigned to each producer of that good, because it is applied to final demand values as well.
n.a. denotes 'not applicable.'

[187] The export quantities by sector for the updated benchmark are from the simulation results and will only be reported in this table. Please refer to this table for the export quantities hereafter.

The table displays the increases and declines in export quantities across sectors based on the change in the sugar export price. The export quantity increases for the Other Agriculture and Export Processing Zone Manufacturing sectors across both tax replacement options and additionally for the Electricity, Gas, and Water sector in the value-added tax replacement case only. The percentage increases in the Export Processing Zone Manufacturing sector of 6.30% and 6.00% occur on a base quantity of 59.3 billion rupees, or on 80.95% of the total export quantity in the updated benchmark, in the value-added and lump-sum tax replacement scenarios respectively.[188] Again, the EPZ sector's percentage change is even more pertinent given its share of the total export quantity. And, the other export quantity increases pale in comparison to this sector in percentage terms, but also in absolute quantity increases, given that they are only 0.19% and 0.20% of the absolute export quantity change for the value-added and lump-sum tax replacement respectively in the Export Processing Zone Manufacturing sector. The next closest increase is roughly 7 million rupees in the Other Agriculture sector across both tax replacements.[189] Thus, the sheer magnitude of difference in export quantity changes across sectors is even more pronounced in the export quantity case than in the output quantity case and again warrants a further discussion of the EPZ sector alone.

The percentage and absolute changes in the export quantity of the Export Processing Zone Manufacturing sector are not unexpected given the EPZ sector is the largest exporter in the Mauritian economy, exporting 87.9% of its total domestic supply and, as previously stated, comprising 80.95% in the total export quantity in the updated benchmark. Thus, one would expect that the increase in the Export Processing Zone Manufacturing sector's export quantities

[188] The total base quantity is from the simulation results and the share of the total export quantity in the updated benchmark is the Author's calculations from the simulation results.
[189] Author's calculations of the absolute difference across simulations by sector as provided through the simulation results.

parallel to the increase in its output quantity of 6.25% and 5.96% for the value-added and lump-sum tax replacement (see Section 3.2.1.) and they indeed do so.[190] In essence, the largest and only significant expansion of export quantity occurs in the Export Processing Zone Manufacturing sector, where export quantity changes closely track the output increases in those sectors in percentage and absolute terms.

On the other hand, the Sugar Milling, Other Manufacturing, Wholesale and Retail Trade and Repairs, Restaurants and Hotels, and the Other Services sectors export quantities decrease in the value-added tax case, and with the lump-sum tax as the replacement tax, the same sectors, along with the Electricity, Gas, and Water sector experience a decrease in their export quantities as well. The Sugar Milling sector suffers the largest decline, reflecting a -91.01% and a -91.03% decrease in export quantities for the value-added tax and lump-sum tax replacement respectively. And, this sizable percentage decrease is concurrent with a -657 million rupees decrease across both tax replacements and is the only decrease of that magnitude, with the next largest decline occurring in the Transport, Storage, and Communications sector at -94 million for the value-added tax case and -76 million rupees for the lump-sum tax scenario, and -38 and -44 million rupees decrease for the value-added and lump-sum tax cases respectively in the Other Services sector.[191] So, even though the percentage changes are not insignificant, the absolute quantity changes do not compare to the decreases found in the Sugar Milling sector, and thus, the latter two sectors will not be addressed.

Focusing on the Sugar Milling sector, the European Union decreases the price it pays for Mauritius' sugar exports by over half, while importing 95.34% of the Sugar Milling sector's

[190] Exports of goods and services, as a percentage of total domestic supply, are from the Author's calculations as reported in Table 4 in Chapter 2. The updated benchmark's total export quantity for the Mauritian economy is calculated in the simulation and the sectoral shares are the Author's calculations.
[191] The absolute changes in export quantity by sector are the Author's calculations from the simulation results.

exports.[192] The marked export quantity decrease is driven by the -99.35% decrease in sugar export quantities flowing to the EU coupled with only a 37.27% increase in the sugar exports destined for the United States and the Rest of the World, much smaller consumers of sugar exports.[193] Also, with the stark output volume contractions, the Sugar Milling sector has less total output to export. The relevance here is that the Sugar Milling sector exports 88.3% of its total domestic supply.[194] So, one would expect a substantial decrease in its export quantity with decreased output volumes. Therefore, the price decline in sugar exports decreases the total export quantity of the Sugar Milling sector rather steeply and it is the key sector of decrease, in percentage and absolute terms, for the Mauritian economy.

Therefore, the Export Processing Zone Manufacturing sector exhibits the largest expansion of export quantity, in percentage and absolute terms, far outstripping the next largest percentage expansion of export quantity because it is a key export sector of the Mauritian economy, reflecting the largest share of total export quantity in the updated benchmark. Also, the price reduction in sugar export price decreases the export quantity of the Sugar Milling sector quite steeply, both percentage and absolute changes, as expected, while other changes were minute in comparison given that the export price reduction occurs in the Sugar Milling sector.

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[192] Author's calculations from the Bank of Mauritius, Annual Report – Various Years.

[193] The export quantity percentage changes by trade partner are calculated in the simulation results. This volume increase does not exceed the actual exported amount of sugar to the U.S. in 1997 of 274 million rupees. It only amounts to 34 million rupees total in the updated benchmark. The constant elasticity of transformation restricts the export quantity increase enough such that the quota volume is not exceeded although the export quantity is allowed to increase without bound.

[194] Author's calculations as reported in the 1997 Benchmark Output and Trade Shares and the Expenditure on Gross Domestic Product (As a Percentage of Total Domestic Supply) tables in Chapter 2.

3.2.3 Economic Effects of the Mauritius Sugar Export Price Reduction by the European Union on Import Volumes by Sector

Another trade variable that changes as a result of the price reduction by the European Union for the price it pays Mauritius for its sugar exports is the import quantity. Table 13 shows the import quantity effects by sector for the value-added and lump-sum tax replacements.

Table 13: Economic Effects of the European Union Sugar Price Reduction on Import Quantity by Sector (Percentage Change from Updated Benchmark Except the Updated Benchmark Output Quantities)[195]

Sectors*	Updated Benchmark Import Quantities (Billions of Rupees)	59% Decrease in Sugar Export Price of the European Union with Value-Added Tax Replacement	59% Decrease in Sugar Export Price of the European Union with Lump-Sum Tax Replacement
Other Agriculture	2.963	1.29	1.15
Sugar Milling	0.539	38.12	37.66
Export Processing Zone Manufacturing	27.001	5.44	5.09
Other Manufacturing	36.438	1.09	0.78
Restaurants and Hotels	1.937	-1.48	-0.78
Transport, Storage, and Communication	4.808	-2.24	-1.61
Other Services	4.811	-0.39	-0.38
Total	78.497	n.a.	n.a.

*Only the sectors with positive import volumes are recorded in this table. Therefore, the Sugarcane, Electricity, Gas and Water, Construction, and the Wholesale and Retail Trade and Repairs sectors are not included here.
n.a. denotes 'not applicable.'

Several effects can be noted from this table. First, the import quantities increase for the Other Agriculture, Sugar Milling, Export Processing Zone Manufacturing, and the Other Manufacturing sectors across both tax replacement options. The Sugar Milling and Export

[195] The import quantities by sector for the updated benchmark are from the simulation results and will only be reported in this table. Please refer to this table for the import quantities hereafter.

Processing Zone Manufacturing sectors reflect the largest percentage increases, but taking into account the size of the quantity changes themselves, the Sugar Milling, Export Processing Zone Manufacturing, and the Other Manufacturing sectors all have sizable absolute increases.[196] The Sugar Milling sector experiences a 38.12% increase in import quantities with value-added tax replacement and a 37.66% increase with lump-sum tax replacement. This is not extreme given the initial values of imports of sugar into Mauritius are small for the only two regions which import sugar into Mauritius, the European Union and the Southern African Customs Union.[197] The sector comprises 0.69% of the total import quantity in the updated benchmark. However, with such a large percentage change applied to the SMI sector's base volume, it still produces a significant increase of 205 million rupees and 202 million rupees for the value-added and lump-sum tax respectively.[198] One might expect an augmentation of the Sugar Milling sector's total output quantity by imports to compensate for decline in output quantities for the sector given 15.7% of its output is consumed on the domestic market (intermediate and final demand combined).[199] Therefore, the import quantity of the Sugar Milling sector increases by a substantial amount because the output quantity declines sharply and the domestic demand of sugar is still present and must be met.

The Export Processing Zone Manufacturing sector's import quantity increases with the 59% price reduction for sugar exports flowing to the European Union as well. In fact, although it has the second largest percentage change increase in import quantity of 5.44% for the value-

[196] The Other Agriculture sector only increases its import quantity by 37 and 34 million rupees for the value-added and the lump-sum tax replacement options respectively. This is considerably smaller than the smallest relevant increase of 205 and 202 million rupees respectively, and thus, it is not included in the discussion before.
[197] Imports of goods and services comprise only 3.8% of SMI total domestic supply of 8.6 billion rupees in the 1997 benchmark. In the updated benchmark, the Sugar Milling sector has the smallest import quantity share across all seven positive import volume sectors at 0.69% of the total import quantity.
[198] The absolute increases in the import quantities are the Author's calculations from the simulation results.
[199] Author's calculations from Table 3.

added tax replacement and 5.09% for the lump-sum tax replacement, the sector yields the largest absolute changes in import quantity. The changes generated in the EPZ sector are 1.5 billion rupees for the value-added tax and 1.4 billion rupees for the lump-sum tax.[200] But, given there is a marked increase in the output quantities for the Export Processing Zone Manufacturing sector (i.e. 6.25% with value-added tax replacement and 5.96% with lump-sum tax replacement – see Section 3.2.1.) and the sector is the second largest importer of Mauritius, consuming 34.40% of the updated benchmark import quantity, the total imports demanded by the EPZ sector are expected to rise.[201] Hence, the Export Processing Zone Manufacturing sector exhibits the largest absolute increases in import quantities although its percentage change ranks second overall, whether the value-added or lump-sum tax replacement is employed because of its use of imported inputs.

In addition, regardless of the tax replacement chosen, the Other Manufacturing sector's absolute changes are significant, although its percentage changes are not substantial. In viewing the absolute changes, the Other Manufacturing sector's import quantity changes by 395 million rupees for the value-added tax replacement and by 282 million rupees for the lump-sum tax replacement.[202] The Other Manufacturing sector actually imports 156.0% of its total domestic supply (i.e. its imports are 1.560 times its domestic supply – see Table 4). The import volume increase is so significant, in this case, with small percentage changes because the Other Manufacturing sector is actually 46.42% of the total import quantity in the updated benchmark with a base of 36.4 billion rupees, making it the largest import consumer in the economy.[203] Thus, one would assume an increase in output quantity would augment this sector's import

[200] The absolute changes in export quantity are the Author's calculations from the simulation results.
[201] Author's calculations as presented in the 1997 Benchmark Output and Trade Shares table in Chapter 2.
[202] The absolute import quantity changes are the Author's calculations from the simulation results.
[203] The share of the total import quantity in the updated benchmark is the Author's calculations from the simulation results.

quantity. In conclusion, the Sugar Milling and Export Processing Zone Manufacturing sectors' import quantities increase by a significant amount in terms of percentage changes, but the Sugar Milling, Export Processing Zone Manufacturing, and the Other Manufacturing sectors experience significant absolute quantity changes.

On the other hand, the Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors all suffer import quantity contractions with the decrease in sugar export prices for the European Union, regardless of the replacement tax chosen. But, the Transport, Storage, and Communication sector suffers the largest percentage decrease, with a –2.24% in value-added tax replacement and –1.62% with lump-sum tax replacement. And, the largest percentage declines are also concurrent with the largest and only significant absolute decrease in export quantity. The Transport, Storage, and Communication sector experiences a -108 million rupees decrease in import quantity for the value-added tax replacement and -78 million rupees decrease for the lump-sum tax replacement. This is much larger than either the -28 and -15 million rupees decrease for the Restaurant and Hotels sector for the value-added and lump-sum tax cases respectively or the -18 million rupees decrease across both tax scenarios for the Other Services sector.[204] Even though the lump-sum absolute decrease in the Transport, Storage, and Communication sector is not as sizable as the ones showcased in the increasing sectors above, the sector's import quantity changes will be further explored.

The marked decline that is seen in the TSC sector is the result of its key customers suffering substantial output declines. The two sectors that comprise about 20% of the TSC sector's inter-industry output, the Sugarcane and Sugar Milling sectors, suffer the largest output quantity contractions. The Sugarcane sector purchases 9.01% of the TSC total inter-industry

[204] The import quantity declines are the Author's calculations from the simulation results.

output supplied and the TSC sector is 11.31% of its total domestic supply costs. And, the Sugar Milling sector's demand waning matters as well, where 39.01% of its total input is comprised of goods and services bought, leased, rented from the Transport, Storage, and Communication sector. The SMI sector purchases 10.98% of the total inter-industry output of the Transport, Storage, and Communication sector. As a result, the TSC sector needn't import as many ships, trains, more steel to expand its storage space, set up new communication towers, lay more telephone lines, etc., because of the sharp declines in the Sugarcane and Sugar Milling sectors' output volumes.[205] Thus, the import quantity percentages decrease for the Transport, Storage, and Communication sector only, whereas the absolute change is more relevant in the value-added tax case, but all are the result of the changes that occur in its key customers' output quantities.

In conclusion, the Other Agriculture, Sugar Milling, Export Processing Zone Manufacturing, and the Other Manufacturing sectors experience the largest positive percentage changes in their import quantities in the Mauritian economy from the 59% Mauritius sugar export price reduction for the European Union, but only the latter three sectors have sizable import quantity changes in absolute terms across both tax replacements. Furthermore, the Transport, Storage, and Communication suffers the largest declines in import quantities, percentage and absolute, due to changes in its key inter-industry consumers' output quantities for both the value-added and lump-sum tax replacement.

[205] The inter-industry share totals and total input costs are the Author's calculations from the Input-Output Table in Chapter 2.

3.2.4 Economic Effects of the Mauritius Sugar Export Price Reduction by the European Union on Welfare, Foreign Exchange, and the Replacement Taxes

Another set of changes that will be addressed are the welfare effects, as measured by the equivalent variation of household consumption demand (percentage change from updated economy's GDP), the real foreign exchange rate adjustments necessary to hold the current-account balance constant (percentage change in the real exchange rate needed to maintaining a constant current-account imbalance), value-added tax rate effects (percentage change in the value-added tax rate to compensate for changes in the government budget to keep the government budget deficit constant), and the lump-sum tax effects (absolute change in the implicit lump-sum tax as measured in billions of real rupees to maintain revenue neutrality). Table 14 outlines the simulation results for welfare, the foreign exchange, and the replacement taxes.

Table 14: Economic Effects of the European Union Sugar Price Reduction on Welfare, Foreign Exchange, Value-Added Tax Rate, and Lump-Sum Taxation (Percentage Change from Updated Benchmark Except Lump-Sum Tax)

Variables	59% Decrease in Sugar Export Price of the European Union with Value-Added Tax Replacement	59% Decrease in Sugar Export Price of the European Union with Lump-Sum Tax Replacement
Welfare	-0.23	-0.29
Foreign Exchange Rate (e)*	0.79	-0.17
Value-Added Tax Rate	-20.28	-
Lump-Sum Tax (Billions of Rupees)	-	-0.71

***e** is defined as Rupees per Foreign Currency.

There are several distinctive elements to consider from Table 14. First, in each instance, the negative terms of trade movement (i.e. the loss of the preferential price for sugar exports)

induces a negative welfare effect, albeit a small decrease. The terms of trade effect is equal to the country's excess supply for exports multiplied by the change in price. Since sugar is exported, the quantities produced are in excess of the quantities consumed in Mauritius, and thus a fall in the relative price of the export, decreases welfare.[206] And, as evidenced in Table 14, Mauritius' welfare decreases. This decrease is consistent with theory in that Mauritius gleans less for its exports in a sector that exports 87.9% of its total domestic supply, the Sugar Milling sector, where the largest region of absorption for the sector, the European Union, absorbs 95.34% of its total exports.[207] Therefore, the welfare declines slightly by –0.23% and by –0.29% across the tax replacement cases because of the decrease in the price for sugar exports by the European Union.

Only small movements in overall welfare, despite such a large change in output, export, and import volumes, may occur for several reasons. One reason the welfare effects are damped is due to the adoption of the domestic tax policy changes to the 1997 benchmark. First, the tariff rate actually increases for the Sugar Milling sector from 8.72% to 10.00%, which places downward pressure on total output and thus, export quantities. Furthermore, the export quantity decreases via output declines stem from the implementation of the value-added tax, where the SMI sector has the highest levy value of 10% applied to it, which decreases the sector's overall output and hence its overall share of export quantity. As a result, the Sugar Milling sector is 5.51% of the total output quantity in the 1997 benchmark (see the Input-Output Table), but is only 0.85% of the total output quantity in the updated benchmark. Also, the export quantity share of the SMI sector is 0.99% in the updated benchmark, falling from 6.38% of the total

[206] Markusen, Melvin, Kaempfer, and Maskus, 1995, p. 384.
[207] Please see the 1997 Benchmark Output and Trade Shares table in Chapter 2. The EU's share of total sugar exports is the Author's calculations from the Bank of Mauritius, Annual Report – Various Years.

export quantity in the 1997 benchmark. In fact, the Sugar Milling sector, which reflects a 14.0% share in the total export value in the 1997 benchmark, has its share fall to only of the 2.32% of the updated export value.[208] Thus, the total output effects, and hence, the overall welfare effects can be damped because of the adopted domestic tax changes.

Second, the foreign exchange effects vary, being either small and positive or small and negative, based on the replacement tax chosen. There is a 0.79% increase in the foreign exchange rate, or a depreciation of the rupee, with the value-added tax replacement. But, this small increase in the real foreign exchange rate is not unusual given the Mauritius' sugar export price falls for the region that absorbed over 95% of its total sugar exports. On the other hand, with the lump-sum tax replacement the foreign exchange rate falls by -0.17%. This may seem counter-intuitive, but $\Delta p_{ri}^{m} M_{ri}$ and $-\Delta p_{ri}^{x} X_{ri}$ additively equated to an overall decrease in the trade deficit and thus, to maintain a constant current-account imbalance, the real foreign exchange rate had to fall by a minute amount. Hence, the foreign exchange rate changes are small and positive with value-added tax replacement and small and negative for lump-sum tax replacement.

Another interesting attribute in Table 14 is that tax revenues increase through the sugar export price change such that the value-added tax rate and the lump-sum taxation fall to maintain a constant government deficit. The value-added tax rates decrease by -20.28%. But, the need to decrease the value-added tax rate directly stems from an increase in the total output quantities for the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sectors, where the sectors have applied value-added tax rates of 3.52%, 9.37%, 9.50%, and 10.00% respectively and the decrease in output quantities for the

[208] Please reference Table 9 for the tariff rates, Table 8 for the value-added tax rates, and the share of the total output quantity, export quantity, and export value are the Author's calculations from simulation results.

Sugarcane, Sugar Milling, Construction, Wholesale and Retail Trade and Repairs, Restaurants and Hotels, Transport, Storage and Communication, and the Other Services sectors, of which five of seven sectors have a zero value-added tax rates applied to them.[209] Also, the value-added tax rate, since it applies to imports as well, is further augmented through import quantity changes. The import quantities increase in the OAG, SMI, EPZ, and the OMA sectors, all of which have positive applied value-added tax rates, while decreasing in the RAH, TSC, and the OSR sectors, where RAH and the TSC sectors have a zero value-added tax rate applied to them, and the OSR sector, although it has a positive value-added tax rate, its import quantity falls by no more than -0.39%.[210]

In addition to the value-added tax revenue increase, the tariff revenue increases as the import quantities rise in the Other Agriculture, Sugar Milling, Export Processing Zone Manufacturing, and the Other Manufacturing sectors by as much as 38.12% and by no less than 1.09%. This occurs concurrently with import quantity decreases falling by no more than -2.24% in the Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors.[211] The reasoning here is similar to that of the value-added tax, the Other Agriculture, Sugar Milling, Export Processing Zone, and the Other Manufacturing sectors have a 9.77%, 10.00%, 2.91%, and 7.60% tariff rate applied to them respectively, coupled with the Restaurants and Hotels and the Transport, Storage and Communications sectors have a zero tariff rate applied to them, and the Other Services sector, which has an applied tariff rate of 10.00%, only

[209] The value-added tax rates are reported in Table 8. The Sugar Milling sector has a 10.00% value-added tax rate and the Other Services sector has a 5.83% rate applied to it. Decreases in these sectors would depress overall value-added tax revenue. But, the increases in the EPZ sector's output alone at 9.37% more than compensates for the decreases in revenues spawned by the Sugar Milling and the Other Services sectors (see Section 3.2.1.).
[210] The import quantity changes are addressed in Section 3.2.3.
[211] Simulation results.

experiencing a small import quantity decreases (less than 0.39% in both tax replacement cases).[212] Thus, the tariff revenue rises.

Likewise, the lump-sum tax's absolute value fell by -0.71 billion rupees or –713 million rupees. Here the total output quantities for the Other Agriculture, Export Processing Zone Manufacturing, and the Other Manufacturing sectors rise, although not by as much in this tax replacement case, and as previously stated, all have positive value-added tax rates. And, in the case of the EPZ and the OMA sectors alone, they comprise 41.39% of the total updated benchmark output quantity of 166.2 billion rupees and experience sizable absolute changes in their output quantities.[213] However, the Sugarcane, Sugar Milling, Electricity, Gas, and Water, Construction, Wholesale and Retail Trade and Repairs, Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors experience declines in their output volume, of which five of eight sectors have zero value-added tax rates applied to them, and for the three other sectors, only the SMI, EGW, and the OSR sectors have an applied value-added tax rate of 10.00%, 10.00%, and 5.83% respectively.[214] Also, the import quantity shifts, as described earlier, boost overall value-added revenue. But, since the import quantity shifts are smaller, the tariff revenue increases by a smaller amount as well. Moreover, the tariff revenue increases as in the value-added tax case, because the same sectors expand and contract, but with even smaller percentage changes in import quantity overall. Thus, the value-added tax rates and the lump-sum taxation falls because some of the most heavily taxed sectors experiencing an

[212] For tariff rates by sector, see Table 9 in Chapter 2.
[213] Author's calculations of the sectoral share of the total updated benchmark output quantity.
[214] The Electricity, Gas, and Water and the Other Services sectors experience small output quantity changes of -0.27% and -0.74% respectively. The Sugar Milling sector is the only sector with a large output quantity decrease of -59.10% and a value-added tax levy of 10.00%. But, this percentage change produces -833 million rupees absolute decrease that is overshadowed by the absolute increase in the EPZ sector of 3.9 billion rupees.

increase in their output and import quantities and some the least heavily taxed decrease in output and import quantities, thus raising the total value-added and tariff revenues.

In conclusion, the 59% decrease in the price paid for Mauritius' sugar exports by the European Union causes small, but negative welfare effects. For the value-added tax replacement and the lump-sum tax replacement, the foreign exchange rate effects are small, but positive and small, but negative respectively. Lastly, the downward scaling of the value-added tax rates as well as the total lump-sum tax needed to maintain revenue neutrality occurs because of the increases in output and import in the most heavily taxed sectors, coupled with decreases in the output and imports of least taxed sectors, in general, which increases the value-added and tariff revenues.

3.2.5 Economic Effects of the Mauritius Sugar Export Price Reduction by the European Union on Labor and Capital Prices

Another set of variables that is affected by the 59% reduction in the price the European Union pays for Mauritius' sugar exports are the real wages for skilled and unskilled labor as well as the real rental rate of capital. Table 15 outlines the economic effect of the sugar export price cut on factor prices. It is as follows:

Table 15: Economic Effects of the European Union Sugar Price Reduction on Factor Prices (Percentage Change from Updated Benchmark)[215]

Variables	59% Decrease in Sugar Export Price of the European Union with Value-Added Tax Replacement	59% Decrease in Sugar Export Price of the European Union with Lump-Sum Tax Replacement
Skilled Labor Wage (SLW)	1.00	0.08
Unskilled Labor Wage (ULW)	0.36	-0.67
Rental Rate of Capital (ROC)	0.96	0.04
SLW/ULW*	0.64	0.76
ROC/ULW**	0.60	0.71

***** SLW/ULW is defined as the percentage change in the relative factor prices or rather the percentage change in the skilled labor wage less the percentage change in the unskilled labor wage.
**ROC/ULW is defined as the percentage change in the relative factor prices or rather the percentage change in the rental rate of capital less the percentage change in the unskilled labor wage.

Table 15 displays several interesting findings. One attribute found in Table 15 is that, regardless of the tax replacement chosen, the skilled labor wage increases from the decrease in price for the Sugar Milling sector's sugar exports. In particular, the real skilled labor wage rises by 1.00% for the value-added tax replacement and by 0.08% for the lump-sum tax replacement. Remember, in the value-added tax replacement scenario, the output quantities increase for the Other Agriculture, Other Manufacturing, Export Processing Zone Manufacturing, and for the Electricity, Gas, and Water sectors. Even though each sector is capital-intensive, the EGW sector's labor force is predominantly skilled. It has a labor forces that is 60.47% skilled, which is above the 57.41% economy average and thus increase in its output will place upward pressure on the skilled labor wage. And, the Electricity, Gas, and Water sector's output volume increases produces a 2 million rupees increase in skilled labor demand. However, the Other Manufacturing sector, although it has a labor force that is primarily unskilled, it still demands

[215] Due to the normalization by the price of consumption, the levels are not comparable across runs. However, the sign of the price changes matters as well as the relative wage changes themselves, where the latter is comparable across simulation runs.

skilled labor because 24.24% of its labor force is skilled. From its output volume change, it demands an additional 3 million rupees of unskilled laborers. This too puts upward pressure on the skilled labor wage. Lastly, the Other Agriculture sector, which also has a labor force that is predominately unskilled (90.66%), still exerts upward pressure on the skilled labor wage because it has positive skilled labor demand. The sector's output quantity increase produces a 1 million rupees additional demand for skilled labor.

However, the most significant output volume increases occurs in the Export Processing Zone Manufacturing sector (see Section 3.2.1.).[216] But, the EPZ sector, which experiences the largest output quantity increase in the economy, is also the second largest consumer of labor in the economy. It has a workforce that is about 24% skilled.[217] And, its output volume change actually produces a 161 million rupees absolute change in the skilled labor demand for value-added tax replacement, far exceeding the next closest skilled labor demand increase of about 3 million rupees for the value-added tax case and 1 million rupees for the lump-sum tax case, far outstripping the aggregate absolute increase of the other sectors' labor demand of 6 and 3 million rupees across each tax replacement respectively.[218] Thus, in the value-added tax case, the increase in the output volume of the Export Processing Zone Manufacturing sector is the main sector that exerts upward pressure on the skilled labor wage because of the sector's increased labor demand, followed by lesser output volume increases that cause the skilled labor wage to rise in the Other Agriculture, Other Manufacturing, and the Electricity, Gas, and Water sectors.

In the case of lump-sum tax replacement, the skilled labor wage increases as well. In particular, the Other Agriculture, Export Processing Zone Manufacturing, and the Other

[216] The skilled labor demand increases by as much as 3.14% in the EPZ sector. The sectoral employment percentage changes are calculated in the simulation results.
[217] The shares of skilled and unskilled laborers by sector are the Author's calculations presented in Table 10 of Chapter 2.
[218] The absolute output quantity changes are the Author's calculations from the simulated results.

Manufacturing sectors experiences smaller increases in output volume. The OAG sector's skilled labor demand increases by 1 million rupees. However, the EPZ sector's additional unskilled labor demand is 154 million rupees. Also, the Other Manufacturing sector's skilled labor demand is 1 million rupees.[219] Hence, the price paid to skilled labor rises regardless to the tax replacement used, as dictated primarily by output changes in Export Processing Zone Manufacturing sector, and to a lesser extent, by the Other Agriculture and the Other Manufacturing sectors.

Another interesting finding is that in the case of unskilled labor's wage, the change in its real wage varies based on whether the value-added tax is used as a replacement or the lump-sum tax. The unskilled labor wage increases by 0.36% in the value-added tax case. And, as previously mentioned in the value-added tax replacement, the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sectors all experience an increase in output quantity of 1.36%, 6.25%, 0.42%, and 0.51% respectively (see Section 3.2.1). And, of the largest percentage increases in output volume, the OAG, EPZ, and the OMA sectors' laborers are predominantly unskilled, where each has a labor force that is 76.76% unskilled.[220] However, the most significant absolute labor demand changes occur in the Export Processing Zone Manufacturing sector. The EPZ sector increases its labor demand by 528 million rupees in the value-added tax scenario, considerably larger than any other sector's increase, where the next largest increase is 16 million rupees in the value-

[219] The absolute skilled labor quantities by sector across the value-added and lump-sum tax replacements are the Author's calculations from the simulation results.

[220] Please reference the skilled and unskilled labor shares by sector as found in Table 10. The Electricity, Gas, and Water sector is skilled labor-intensive. However, there is only a 0.51% increase in its output which would put more upward pressure on the skilled labor wage relative to the unskilled labor wage. See Table 5 for further details on capital- and labor-intensity. Also, the Export Processing Zone Manufacturing sector increases its usage of unskilled labor by 3.31%. The Other Agriculture sector absorbs 0.80% of additional unskilled workers, and, the Other Manufacturing sector gains 0.43% of unskilled workers reshuffled from output volume decreases elsewhere.

added tax scenario.[221] The Other Manufacturing sector produces the second largest absolute demand for unskilled labor with 16 million rupees in the value-added tax scenario. The Other Agriculture sector produces the third largest labor demand increase of 13 million rupees. And, each sectors' share of unskilled laborers of their total labor forces are above the 57.41% average skilled laborer composition in the economy, at 76.76% unskilled laborers (see Table 10). Thus, the unskilled labor wage increases by movements in this sector's output. All in all, unskilled labor's wage increases by 0.36% for the value-added tax replacement case because of output volume increases largely driven by the Export Processing Zone Manufacturing sector, but to a smaller degree, by the Other Manufacturing and Other Agriculture sectors as well.

In terms of the lump-sum tax replacement, the unskilled labor's wage does fall by -0.67%. Yet again, the Export Processing Zone Manufacturing sector increases its labor demand by the largest amount and demands 509 million rupees worth of additional unskilled laborers in the lump-sum tax scenario, with the next highest absolute labor demand being 12 million rupees in the Other Agriculture sector, 11 million rupees in the Other Manufacturing sector, and 10 million rupees in the Construction sector. These labor demand increases occur while the unskilled labor demand contractions in the Sugarcane and Sugar Milling sector equal –432 and –81 million rupees respectively and the decreases are -3, -19, and –10 million rupees for the Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors respectively.[222] Therefore, the amount of upward pressure on unskilled labor's wage is because the increases in the output volume of the Other Agriculture, Export Processing Zone Manufacturing, and the Other Manufacturing sectors, along with the increase in skilled labor

[221] The absolute change is the Author's calculations from the simulation results. Please note that the OMA and OMA sectors incur a 16 and 13 million rupees increase in unskilled labor demand, which puts upward pressure on the wage as well.

[222] The absolute unskilled labor demand decreases by sector are the Author's calculations from the simulation results.

demand in the Construction sectors is smaller than the downward pressure on the wage by the Sugarcane and the Sugar Milling sectors primarily, but also in the Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors, which causes an overall decrease in real wage in the lump-sum tax case.

Lastly, as evidenced through Table 15, the rental rate of capital increases regardless of the tax replacement chosen. The rental rate of capital increases by 0.96% in the case of value-added tax replacement and by 0.04% in the case of lump-sum taxation replacement. As previously stated, with value-added tax replacement, output volume increases occur in the Export Processing Zone Manufacturing, Other Agriculture, Electricity, Gas, and Water, as well as the Other Manufacturing sectors, listed in order of magnitude, and each of which are capital-intensive with 16.8% versus 16.4%, 51.3% versus 28.3%, 21.9% versus 18.3%, and 22.3% versus 12.7%, of their total domestic supply accounted for by capital versus labor costs respectively.[223] The EPZ sector comprises the largest proportion of the total capital usage at 26.74% of the total capital employment in the updated benchmark. And, the EPZ sector's capital demand increase dominates all other sectoral increases, with a 677 million rupee increase in capital, and the next closest at 21 million rupees, occurring in the OAG sector, followed by 10 million rupees in the OMA sector and 2 million rupees in the EGW sector.[224] Thus, the rental rate of capital increases because of the output increases primarily in the Export Processing Zone Manufacturing sector, as well as through the Other Agriculture, Other Manufacturing, and the Electricity, Gas, and Water sectors.

Furthermore, there is a 0.04% increase in the rental rate of capital in the lump-sum tax case. Again, this can be attributed to the increases in output for the Other Agriculture, Export

[223] Please review Table 5 in Chapter 2.
[224] The absolute capital demand changes by sector are the Author's calculations form the simulation results.

Processing Zone Manufacturing, and the Other Manufacturing sectors (see Section 3.2.1.). Capital demand increases occurs in the EPZ and the OAG sectors, with a 638 million rupees increase and an 18 million rupees increase respectively. In conclusion, the rental rate of capital increases with the 59% decrease in the price the European Union pays for sugar exports from Mauritius because of increased output volumes in the EPZ sector mainly, followed by increases in the OAG, OMA, and the EGW sectors to a lesser extent, but it increases in the lump-sum tax replacement case due to increases in output quantity in the OAG and the EPZ sectors.

The Stolper-Samuelson theorem does not seem to be observed here. It is only when one reviews the relative wage change does it become more evident who the winner and losers are in the economy. The percentage change in the ratios of skilled labor wage and rental rate of capital percentage changes to the unskilled labor wage percentage change, displays that the skilled laborers as well as the capitalist fare better than the unskilled laborers. The SLW/ULW ratios are 0.64% for the value-added tax and 0.76% for the lump-sum tax, while the ROC/ULW ratios are 0.61% and 0.71% for the value-added tax and the lump-sum tax replacement respectively. The unskilled labor wage falls across both tax cases relative to the skilled labor wage or the rental rate of capital, showing that the unskilled laborers are the worst off with the preferential sugar price reduction. Thus, the unskilled laborer is more adversely affected by the preferential price removal by the European Union than either the skilled laborers or the capitalist and is hurt marginally more in the lump-sum tax case than in the value-added tax case.

Thus, the wage rate of skilled labor rises, primarily due to the Export Processing Zone Manufacturing sector's increased output, and to a lesser extent from the Other Agriculture, Other Manufacturing, and Electricity, Gas, and Water sectors' increased output, but increases in the lump-sum tax case because of output volume increases in the Other Agriculture, Export

Processing Zone Manufacturing, the Other Manufacturing sectors, and increased skilled labor demand in the Construction sector. On the other hand, unskilled labor's wage changes vary, based on the tax replacement chosen, experiencing a small and positive increase or a small and negative decrease for the value-added and lump-sum tax replacement respectively, largely driven by the EPZ sector, but still supported by the Other Agriculture, Other Manufacturing, and Electricity, Gas, and Water sectors, with the decrease in wage stemming from the output quantities in the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing sectors, with increases in the Construction and the Wholesale and Retail Trade and Repairs sectors not increasing wages enough to counteract the downward pressure from the large contractions of the Sugarcane and Sugar Milling sectors occur, and smaller decreases in the Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors as well. Furthermore, the rental rate of capital increases for each tax replacement choice with a 59% decrease in the European Union price paid for Mauritius' sugar exports, because the output volume increases for the OAG, EPZ, OMA, and EGW sectors in the value-added tax case, but in the lump-sum tax case due to significant increases in output and hence capital demand in the EPZ sector, and minutely from the increases in output in the OAG sector. If one focuses on the relative factor price changes, it is evident the unskilled labor fares the worst out of all the factor inputs.

3.3 45% MAURITIUS SUGAR EXPORT PRICE REDUCTION BY THE UNITED STATES

There are repercussions to repealing the preferential pricing that Mauritius receives for its sugar exports from the United States as well. This rings true despite the European Union absorbing 95.34% of total sugar exports flowing from Mauritius in 1997 because the United States absorbs 3.77% of total exports in that same year and at a price that is 1.85 times the world price. Therefore, the effects of a 45% decrease in the price the United States pays for Mauritius' sugar, where the preferential price is reduced to the world price, on output, export, and import quantities, welfare, the foreign exchange rate, the value-added tax rates, lump-sum taxation, the skilled and unskilled labor wages, and the rental rate of capital are outlined in this section.[225] Again, each of these variables will detail the economic effects experienced as a result of the decrease in the preferential price to the world price for sugar exports being earned from sales to the United States.

3.3.1 Economic Effects of the Mauritius Sugar Export Price Reduction by the United States on Output Volumes by Sector

The output quantity is the first variable that will be discussed that is affected by the United States changing its preferential pricing for Mauritius' sugar exports to the world price of one. The economic effects of the 45% Mauritius sugar export price reduction by the U.S. on output volume by sector are detailed in Table 16. It is as follows:

[225] All percentage changes are from the updated benchmark economy, or updated benchmark, which is inclusive of the tariff changes that occur from 1997-2000 and the introduction of the value-added tax in 1998, with constant indirect taxes net of subsidies rates.

Table 16: Economic Effects of the United States Sugar Price Reduction on Output Quantity by Sector (Percentage Change from Updated Benchmark)

Variables	45% Decrease in Mauritius Sugar Export Price for the United States with Value-Added Tax Replacement	45% Decrease in Mauritius Sugar Export Price for the United States with Lump-Sum Tax Replacement
Sugarcane	-3.47	-3.71
Other Agriculture	0.22	0.08
Sugar Milling	-3.69	-3.94
Export Processing Zone Manufacturing	0.62	0.35
Other Manufacturing	0.33	0.02
Electricity, Gas, and Water	0.73	-0.01
Construction	-7.97E-05	-1.00E-03
Wholesale and Retail Trade and Repairs	-0.72	-0.02
Restaurants and Hotels	-0.55	-0.11
Transport, Storage, and Communication	-0.64	-0.11
Other Services	0.02	-0.04

As evidenced by the results in Table 16, output quantities are both positively and negatively affected by the U.S. price cut. In the value-added tax replacement scenario, the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, Electricity, Gas, and Water, and the Other Services sectors' output volumes increase. However, the Electricity, Gas, and Water and the Export Processing Zone Manufacturing sectors experience the two largest percentage increases in their output quantities, although small quantitatively, that occur in this simulation run of 0.73% and 0.62% respectively. On the other hand, in the lump-sum tax case, the Export Processing Zone Manufacturing sector has the largest percentage increase of 0.35% although it is also minute. But, as in the EU case, the Export Processing Zone Manufacturing sector is most expansionary, with absolute changes of 408 million rupees in the value-added tax case and 229 million rupees in the lump-sum tax case, far exceeding the next closest increases of

65 million rupees, as it represented through the Electricity, Gas, and Water sector in the value-added tax replacement scenario, and, exceeding the 3 million rupees increase in the Electricity, Gas, and Water sector and in the Other Agriculture sector that are present in the lump-sum tax replacement scenario.[226] In fact, the EPZ sector's output volume increase dominates all other sectoral increases, as in the EU price cut scenario, with the aggregate output volume increases of all other sectors equating to only 24.51% and 2.62% of the total absolute increase experienced in the EPZ sector alone in the lump-sum and the value-added tax cases respectively.[227] All prior arguments concerning the EPZ sector, as given in Section 3.2.1., apply here as well. The Export Processing Zone Manufacturing sector's output increases from relative wage decreases of the unskilled labor in the lump-sum tax case. The Other Manufacturing sector still incurs increases in demand, which increases the Export Processing Zone Manufacturing sector's demand. Furthermore, the depreciation of the rupee in the value-added tax case increases output because the EPZ sector's production is heavily exported. And, the decrease in the value-added tax rate favors the sector since it has a large levy imposed on it. Thus, the Export Processing Zone Manufacturing sector has small percentage changes, but given the large base to which they are applied, it still translates into sizable absolute changes of at least 229 million rupees from the unskilled labor wage falling relative to other factor inputs in the lump-sum tax case, the increase in the output volume of the Other Manufacturing sector, the devaluation of the currency in the value-added tax case, and the decrease in the value-added tax.

Please note that the output volume increases are much smaller in magnitude here than in the European Union scenario, because a smaller portion of the total Sugar Milling exports that are affected falls from 95.34% to 3.77%, where the latter is the share of total sugar exports that

[226] The absolute quantity changes are the Author's calculations from the simulation results.
[227] The percentages of the EPZ sector's absolute changes are the Author's calculations from the simulation results.

the United Stated purchases from Mauritius. Thus, the Electricity, Gas, and Water (in the value-added tax replacement only), the Export Processing Zone Manufacturing (in both tax replacement scenarios), and the Other Agriculture (in the lump-sum tax replacement only) sectors are the most expansionary sectors concerning output percentage changes and all are marginal, but only the Export Processing Zone Manufacturing sector's output volume change is pertinent in absolute terms across both tax replacement options.

On the other hand, the Sugarcane, Sugar Milling, Electricity, Gas, and Water (for the lump-sum tax replacement case only), Construction, Wholesale and Retail Trade and Repairs, Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services (for the lump-sum tax case only) sectors' output volumes contract. In both tax cases, the most contractionary sectors from the 45% price reduction of sugar export price by the United States for sugar originating in Mauritius in terms of percentage are the Sugar Milling and the Sugarcane sectors, in order of magnitude. The Sugar Milling sector output quantity decreases by –3.69% for the value-added tax case and by –3.94% for the lump-sum tax case while the Sugarcane sector decreases by –3.47% and –3.71% across both tax replacements respectively. Even though the two sectors cited above have the largest percentage reduction, the Wholesale and Retail Trade and Repairs and the Transport, Storage, and Communication sectors incur the largest absolute change in output quantity in the value-added tax case only, with –95 and –88 million rupees declines for each respectively. These decreases are larger than the –59 million rupees decrease in the Sugarcane sector and –52 million rupees decline for the Sugar Milling sector.[228]

[228] The largest percentage change decrease does not equate to the largest absolute changes occurs because the percentage changes in output volumes produced by the U.S. decreasing the price it pays for sugar exports from Mauritius are much smaller than in the European Union preferential price removal and is applied to base amounts that equate to 1.03% and 0.85% of the total output quantity for the SUG and the SMI sectors respectively. The WRT and the TSC sectors are 8.00% and 8.35% of the total output quantity and thus, the absolute decreases are larger than the decreases experienced in the Sugarcane and the Sugar Milling sectors.

However, the absolute changes for all sectors are quantitatively small. Thus, they will not be addressed any further.

In the lump-sum tax case, the output volume for the Sugarcane sector decreases by –63 million rupees and the Sugar Milling sector decreases by –55 million rupees, representing the largest and second largest absolute decrease in the economy. In this tax scenario, the next closest absolute output quantity decrease is –16 million rupees. However, these changes are small and are of a much smaller magnitude relative to the EU price cut case that they warrant no further discussion except in reference to the EU. The two largest percentage declines flip in order of intensity from the EU case, but the magnitude of the absolute output volume decline in the SUG sector still exceeds the SMI sector's decline. Again, the high price elasticity is exhibited as in the Taylor, Yúnez-Naude, and Hampton (1999) study. And, the Nielsen (2003) study is adhered it in that the removal of the preferential pricing agreement depresses production of the said good affected by the removal. Hence, the Sugar Milling and the Sugarcane sectors experience the largest percentage contractions of their output quantities across both tax replacements, but are only the largest absolute changes in the lump-sum tax case, still driven by high output price elasticity and loss of preferential pricing effects, where the Wholesale and Retail Trade and Repairs sector and the Transport, Storage, and Communication sector have larger absolute changes in the value-added tax case, and the absolute changes of the SUG and SMI sectors are much less pronounced and also reflect a reverse percentage order in magnitude as compared to its EU counterpart.

All in all, each output percentage increase is quantitatively small for the sectors that do increase and even though the Export Processing Zone Manufacturing sector percentage increases are minute, only the absolute volume changes of the EPZ sector are relevant, regardless of tax

replacement. This is parallel to the EU preferential price removal case, but is smaller in magnitude. On the other hand, the Sugar Milling and the Sugarcane sectors output volume percentage decreases are the largest across both tax replacement scenarios. However, the Wholesale and Retail Trade and Repairs and the Transport, Storage, and Communication sectors yield the largest absolute output quantity changes in the value-added tax case. Only in the lump-sum tax case do the Sugar Milling and Sugarcane sectors have the second largest and the largest absolute declines, respectively. However, unlike the EU case, every sector that suffers output volume decreases reflect a much smaller absolute quantity decrease occur across both tax replacement options, in addition to the percentage declines being in the reverse order for the SUG and SMI sectors, although the order of the absolute changes remain the same.

3.3.2 Economic Effects of the Mauritius Sugar Export Price Reduction by the United States on Export Volumes by Sector

The change in the sugar export price that the United States pays for Mauritius' sugar exports to the world price also affects the export volumes by sector. The shift of the export volumes in each sector from the decreased sugar export price is reported in Table 17 for both the value-added tax and the lump-sum tax replacements.

Table 17: Economic Effects of the United States Sugar Price Reduction on Export Quantity by Sector (Percentage Change from Updated Benchmark)

Sectors*	**45% Decrease in Mauritius Sugar Export Price for the United States with Value-Added Tax Replacement**	**45% Decrease in Mauritius Sugar Export Price for the United States with Lump-Sum Tax Replacement**
Other Agriculture	0.23	0.09
Sugar Milling	-6.47	-6.68
Export Processing Zone Manufacturing	0.62	0.35
Other Manufacturing	0.32	-0.01
Electricity, Gas, and Water	0.75	-0.03
Wholesale and Retail Trade and Repairs	-0.68	-0.04
Restaurants and Hotels	-0.53	-0.12
Transport, Storage, and Communication	-0.61	-0.13
Other Services	0.07	-0.07

*Only the sectors with positive export volumes are recorded in this table. Therefore, the Sugarcane and the Construction sectors are not included here. Also, the Electricity, Gas, and Water sector would not have any positive export volume had it not been assigned an amount through the application of the calculated supply shares to the exports of goods and services, a mechanism which is applied to usage values to ensure the share of production of a composite good is assigned to each producer of that good, because it is applied to final demand values as well.

Table 17 displays several key results. Focusing on the value-added tax replacement case, the export volumes for Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, Electricity, Gas, and Water, and the Other Services sectors increase. The largest percentage expansion belongs to the Electricity, Gas, and Water (0.75%) as well as to the Export Processing Zone Manufacturing (0.62%) sectors. However, the EGW sector is less than a tenth of a percent of the total export quantity in the updated benchmark and only has any positive volume for consistency in the application of supply shares to final demand, while the EPZ sector is 80.95% of the total export quantity in the updated benchmark.[229] Thus, the only significant export quantity change occurs in the Export Processing Zone Manufacturing sector. With the EPZ sector, although there is a 0.62% change, it produces a –368 million rupees change in absolute terms.[230] This mirrors the European Union preferential price removal case in that the EPZ sector has the largest absolute export quantity increase, but it is much smaller in magnitude in the U.S. case given that the changes are generated by only 3.77% of the Sugar Milling sector's exports being affected by United States' reduction of its preferential price to the world price. And, again the previous arguments presented in the EU case apply here, with the share of the total updated benchmark and the fact the EPZ sector exports 87.9% of its total domestic supply. Thus, the export quantity expansion tracks the output volume expansion, where there is an output expansion of 0.62% (see Section 3.3.1.).

With the taxation applied in a non-distortionary fashion, only the Other Agriculture and Export Processing Zone Manufacturing sectors experience a percentage increase their total exports volumes of 0.09% and 0.35%, as in the EU price cut case. However, the largest expansion of export quantities and only substantial adjustment is still held by the Export

[229] The share of the total export quantity is the Author's calculations from the simulation results.
[230] The absolute difference is the Author's calculations from the simulation results.

Processing Zone Manufacturing sector. It increases by 209 million rupees and the export volume for the OAG sector changes by less than 1 million rupees.[231] Again, the key impetus of the export quantity change, as in the former tax case, is the similar increase in its output quantity increases where the EPZ output quantity increase of 0.35% (see Section 3.3.1) is equal to the 0.35% increase in its export quantity because it is such a substantial export sector of the Mauritian economy. Thus, in the lump-sum tax case the Other Agriculture and the Export Processing Zone Manufacturing sectors experience minute percentage gains in export volume, but the only significant absolute increase rests in the EPZ sector only, just as in the European Union preferential price reduction scenario.

On the other hand, contracting export volumes in the value-added tax case are reflected by the Sugar Milling, Wholesale and Retail Trade and Repairs, Restaurants and Hotels, and the Transport, Storage, and Communication sectors. Here, the only substantial percentage decline belongs to the Sugar Milling sector as in the European Union preferential price removal case. And, the absolute decrease of –47 million rupees is larger than the –22 million rupees decline as seen in the Transport, Storage, and Communication sector, the next largest decrease in any given sector, but both are small.[232] Since the changes are relatively small, neither sector will be further addressed other than in reference to the EU price cut case.

With lump-sum taxation, the Sugar Milling, Other Manufacturing, Electricity, Gas, and Water, Wholesale and Retail Trade and Repairs, Restaurants and Hotels, Transport, Storage, and Communication, and Other Services sectors total export volume declines. The Sugar Milling sector still holds the largest export quantity contraction of -6.68%. This equates to a –48 million rupees decrease in absolute terms, which is well above the –5 million rupees exhibited in the

[231] The absolute differences reported are the Author's calculations from the simulation results.
[232] The absolute changes in export volume by sector are the Author's calculations from the simulation results.

Transport, Storage, and Communication sector.[233] These are both minute and are of a much smaller magnitude than in the EU case because the smaller quantity of sugar exports affected by the U.S. preferential price decrease. Again, since the United States only buys 3.77% of the total sugar exported, the total decline in exports is not as steep as in the EU price adjustment. Thus, regardless to the tax replacement, the steepest decline of export quantity, in percentage and absolute terms, occurs in the Sugar Milling sector, reflective of the European Union case, but are significantly smaller movements quantitatively.

In conclusion, with the value-added tax replacement, the Electricity, Gas, and Water and the Export Processing Zone Manufacturing sectors' percentage export volume expansions are largest, but only the EPZ sector expansion is relevant, as in the EU case. And, the largest percentage expansion of export quantity occurs in the Export Processing Zone Manufacturing and the Other Agriculture sectors in the lump-sum tax case, but again with significant absolute term changes in the Export Processing Zone Manufacturing sector only, reflective of the EU simulation. Both of these findings mirror the European Union case, although the percentage and absolute changes are smaller in the U.S. case than in the former case. On the other hand, the Sugar Milling sector and the Wholesale and Retail Trade and Repairs sectors suffer the largest export percentage decreases with value-added tax replacement and the Sugar Milling and the Transport, Storage, and Communication sectors reflect the largest percentage declines in the lump-sum tax case. However, the steepest absolute declines of the export quantity occur in the Sugar Milling sector across both tax replacement options. The pattern is reminiscent of the European Union preferential price removal case, albeit much smaller adjustments now occur.

[233] The absolute difference in the export quantities is the Author's calculations from the simulation results.

3.3.3 Economic Effects of the Mauritius Sugar Export Price Reduction by the United States on Import Volumes by Sector

In the Mauritius sugar export price reduction by the U.S. region, another trade variable, the import volume, also change. The import quantity changes produced with value-added tax replacement and lump-sum taxation replacement are described in Table 18 below.

Table 18: Economic Effects of the United Stated Sugar Price Reduction on Import Quantity by Sector (Percentage Change from Updated Benchmark)

Sectors*	**45% Decrease in Mauritius Sugar Export Price for the United States with Value-Added Tax Replacement**	**45% Decrease in Mauritius Sugar Export Price for the United States with Lump-Sum Tax Replacement**
Other Agriculture	0.21	0.08
Sugar Milling	1.74	1.37
Export Processing Zone Manufacturing	0.62	0.30
Other Manufacturing	0.34	0.05
Restaurants and Hotels	-0.70	-0.04
Transport, Storage, and Communication	-0.69	-0.09
Other Services	-0.03	-0.02

*Only the sectors with positive import volumes are recorded in this table. Therefore, the Sugarcane, Electricity, Gas and Water, Construction, and the Wholesale and Retail Trade and Repairs sectors are not included here.

Several interesting findings are present in the import quantity shifts. First, across the value-added taxation and lump-sum taxation cases, the largest percentage increases in the import volume occur in the Sugar Milling sector, and to a lesser extent, in the Export Processing Zone Manufacturing sector. The Sugar Milling sector increases its volume of imports by 1.74% and 1.37% for the value-added and lump-sum tax replacement respectively and the Export Processing Zone Manufacturing sector increases its import quantity by 0.62% and by 0.30%

across both tax replacements respectively. However, in absolute terms, the significant increases in import quantity occur in the Export Processing Zone Manufacturing sector and the Other Manufacturing sector, even though the latter sector only experiences a 0.34% and 0.05% change in import quantity.[234] Please note that the Other Manufacturing sector is 46.42% of the total import quantity in the updated benchmark and the Export Processing Zone Manufacturing sector comprises 34.40% of the total while the Sugar Milling sector is only 0.69% of the total import volume in the updated benchmark.[235]

With a smaller percentage change in the SMI sector, it only yields a 9 and 7 million rupees increase in total import quantity for the sector, differing from the EU case in that the changes are now marginal. The difference in import quantity that is generated is largest for the EPZ sector at 168 and 82 million rupees for the value-added and lump-sum tax replacement respectively. The difference yielded in the Other Manufacturing sector is 124 million for the value-added tax case and 16 million for the lump-sum tax case.[236] These two are smaller than in the EU case, and are not as significant in the lump-sum sum tax case. However, the latter two sectors will be addressed.

In the case of the Export Processing Zone Manufacturing sector, since it is second largest importer of goods and services in Mauritian economy, it follows that the demand for imported inputs necessary to produce increases as its total output quantity increase, as previously

[234] The increase in the volume of imports in the Sugar Milling sector is driven by the European Union and the Southern African Customs Union's change in import volume. Their import volumes increase by 1.74% and 1.37% in the value-added and lump-sum tax cases respectively.[234] As previously mentioned in the EU price simulations, due to the sizable decline in output, import quantity increases are to be expected given the domestic demand for sugar still exists and must be met.

[235] The share of the total import quantity by sector for the updated benchmark is calculated by the Author from the simulation results.

[236] The import quantity absolute changes are the Author's calculations from the simulation results.

discussed in European Union price cut scenario.[237] The Other Manufacturing sector actually imports, as stated in Section 3.2.3., 1.560 times its total domestic supply. Hence, the small increases in output would translate into much larger increases in the import volume for the OMA sector. The ordinal ranking of the percentage changes is the same as in the European Union simulated price change, but the size of the increases are of a much smaller size for these sectors as well. And, as previously stated, the smaller changes in import volume are because the U.S. price cut affects a much smaller portion of the overall export quantity for the SMI sector and a smaller output effect occurs which then leads to a smaller import quantity change. Therefore, the Sugar Milling and Export Processing Zone Manufacturing sectors tout the largest percentage increases in import volume, irrespective of the tax replacement used, with the percentage increases being reminiscent of the EU price cut case, albeit of a smaller magnitude, and the absolute changes in the Export Processing Manufacturing sector and the Other Manufacturing sector are sizable only when the value-added tax replacement is employed and are marginal otherwise.

Another interesting finding presented in Table 18 is that the import quantity decreases for the Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors. The largest percentage declines in import quantity, however, occur in the Restaurants and Hotels sector and the Transport, Storage, and Communication sector. They both still decline in quantity, but which sector exhibits the largest percentage contraction varies across the tax replacement chosen. In the value-added tax case, the RAH sector dominates the percentage decline with a –0.70% import volume decline and the TSC sector comes in second place with a –0.69% decrease. However, in the lump-sum replacement scenario, the Transport, Storage, and

[237] Please see the Benchmark Output and Trade Shares table in Chapter 2.

Communication sector holds the largest contraction in import quantity with –0.09% and the Restaurants and Hotels sector decreases by only –0.04%. Each of these percentage changes cause the total import quantity to decrease by a marginal amount of no more than –33 million rupees and generates import quantity changes that are as small as –1 million rupees when considering both tax replacement choices.[238] Thus, they will not be discussed any further other than in reference to the EU case.

In the EU scenario, the TSC sector's import volume percentage declines are greater than the RAH sector's decreases in both tax replacement scenarios. And, even though the percentage decrease is larger in the Restaurants and Hotels sector, the absolute change is still larger in the Transport, Storage, and Communication sector. However, the sheer size of the export quantity contractions is much smaller in the U.S. case than in the EU case. And, as before, the smaller magnitude of the contractions is induced by smaller export quantities being affected by the U.S. price cut in the Sugar Milling sector which causes smaller output effects that then cause smaller import effects. Hence, the import quantity contracts most heavily for the Restaurants and Hotels as well as the Transport, Storage and Communication sectors in percentage and absolute terms, although the ordinal ranking in their total percentage contraction amount changes with the tax replacement chosen for revenue neutrality, and, are also of a smaller size than that found in the EU simulation case.

In conclusion, the Sugar Milling and Export Processing Zone Manufacturing sectors incur the largest percentage increases in import volume, regardless to whether the value-added or lump-sum tax is used to ensure a constant government deficit as in the EU case, but are of a smaller magnitude in this case. The Export Processing Zone Manufacturing sector, followed by

[238] The absolute differences are the Author's calculations from the simulation results.

the Other Manufacturing sector, absolute import quantity increases are the largest, although smaller in size than in the EU price cut case. Please note the magnitude of the change is only significant in the value-added tax case, becoming minute in the lump-sum tax case. Also, the Transport, Storage and Communication and the Restaurants and Hotels sectors experience the steepest import quantity declines, reversing their ranking with the different tax replacements, unlike the EU scenario only in that the TSC sector's import quantity decline always outweighs the RAH sector's decline and that the decreases are always marginal.

3.3.4 Economic Effects of the Mauritius Sugar Export Price Reduction by the United States on Welfare, Foreign Exchange, and the Replacement Taxes

With the decrease in the price the United States pays for sugar exports from Mauritius to the world price of one, the set of variable changes that will be addressed in this section are welfare, the real foreign exchange rate, the value-added tax rate, and lump-sum taxation. Table 19 presents the economic effects of the removal of the preferential pricing of sugar exports by the United States on welfare, the foreign exchange rate, and the replacement taxes. It is as follows:

Table 19: Economic Effects of the United States Sugar Price Reduction on Welfare, Foreign Exchange, Value-Added Tax Rate, and Lump-Sum Taxation (Percentage Change from Updated Benchmark Except Lump-Sum Tax)

Variables	45% Decrease in Mauritius Sugar Export Price for the United States with Value-Added Tax Replacement	45% Decrease in Mauritius Sugar Export Price for the United States with Lump-Sum Tax Replacement
Welfare	0.05	-0.01
Foreign Exchange Rate (e)	0.91	-0.01
Value-Added Tax Rate	-19.34	-
Lump-Sum Tax (Billions of Rupees)	-	-0.68

*e is defined as Rupees per Foreign Currency.

Table 19 showcases three distinguishing effects. First, the welfare is increased by 0.05% with the removal of price distortion in the value-added taxation case, but decreases by -0.01% with lump-sum taxation replacement. Albeit a small increase and decrease in each case respectively, the value-added tax replacement is most-welfare improving. One can attribute the difference to a removal of a price distortion and replacing the revenue changes with a distortionary tax was just enough to cause a more efficient allocation of factor inputs, moving them to sectors that use them more efficiently such that it boosts overall welfare, even in the face of a terms of trade hit.

But with a decrease in export price in the Sugar Milling sector, for which the price is so inflated and it suffering extreme contractions in its output, it is not unlikely that the welfare for Mauritius may decrease because of the decline in the terms of trade.[239] This decrease in welfare exists in the case of lump-sum tax replacement, where no other distortion is introduced into the economy, and it allows the terms of trade decline to filter through to welfare since the tax replacement does not favor any given sector over another. This is on par with the theory of the second best, stating that the removal of one distortion in the face of other distortions may or may

[239] Please see the Benchmark Output and Trade Shares table in Chapter 2.

not be welfare-improving.[240] In the value-added tax case, this is a stark contrast to the –0.23% decrease in the EU preferential price removal and in the lump-sum tax case, where the U.S. case produces a much smaller welfare decline. Thus, welfare increases marginally by 0.05% when the distortionary value-added tax is used to maintain the government deficit, while welfare decreases by –0.01% with the non-distortionary lump-sum taxation is applied to maintain the government deficit, differing substantially from the EU price cut scenario.

The welfare changes are even more miniscule in the United States price cut case than in the European Union preferential price removal simulation set. The reasoning for the small welfare effects are as presented in the EU case (see Section 3.2.4.), namely the adoption of the domestic tax policy changes may damp the overall welfare changes because it greatly depresses the output of the SMI sector prior to the sugar export price cut ever being applied.

Second, the real foreign exchange rate increases by 0.91% with the value-added tax replacement and decreases by -0.01% with the lump-sum tax replacement. As previously stated, the increase in the real foreign exchange rate is not atypical given that the sugar export price falls for the region that absorbed the residual exports of sugar in 1997, which denotes a depreciation of the rupee. But, the slight decline in the real exchange rate occurred with lump-sum taxation, which no longer favors one sector over another as the value-added tax rate did, and, since output did not increase as drastically in the lump-sum taxation case, export and import volumes did not change as much either, lending to damped change in the foreign exchange rate, where it actually had to decrease slightly to maintain the current-account imbalance. The foreign exchange rate movement is reminiscent of the EU price cut scenario in that it is small and positive for the value-added tax replacement and small and negative for the lump-sum tax replacement

[240] Markusen, Melvin, Kaempfer, and Maskus, 1995, p. 149.

respectively, with the latter change being essentially equal to zero. All of the previous arguments that apply in the European Union price cut simulations apply here. Hence, the real exchange rate is dependent on the tax replacement chosen, as with the European Union, and the magnitude of its change varies, based on the output, export, and import volume changes.

Third, the value-added tax rate and the lump-sum taxation needed to maintain a constant government budget deficit declines. The value-added tax rate is scaled downward by -19.34% to keep the government budget constant. As in the case of the European Union, the increase in output quantity in some of the sectors most heavily taxed by the value-added tax while decreasing in the least heavily taxed sectors. More specifically, the output quantities for the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, Electricity, Gas, and Water, and the Other Services sectors increase, where each are taxed positively (3.52%, 9.37%, 9.50%, 10.00%, and 5.83% respectively) and decrease in the Sugarcane, Sugar Milling, Construction, Wholesale and Retail Trade, and Repairs, Restaurants and Hotels, and Transport, Storage, and Communication sectors, of which only one sector has a positive value-added tax rate levied against it.[241] The output shifts are smaller here than in the European Union simulation case due to less of the total Sugar Milling sector's exports quantities being affected by the U.S. price change. Thus, the value-added tax revenue increases because of output quantity shifts, but increases by a lesser extent than in the EU price cut case.

Also, the import quantity shifts account for increased value-added tax revenues given that the value-added tax is applied to imports as well. The Other Agriculture, Sugar Milling, Export Processing Zone Manufacturing, and the Other Manufacturing sectors import quantities increase

[241] Please see Table 8 for the value-added tax rates. The Sugarcane sector's output volume change of –59 million rupees at an applied value-added tax rate of 5.83% is much smaller than the 408 million rupees increase in the Export Processing Zone Manufacturing at an applied value-added tax rate of 9.37%.

by no more than 1.74% and by no less than 0.05% across both tax replacement choices. These increases occur in the sectors that comprise 85.28% of the total import quantity in the updated benchmark.[242] And, the Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors' import quantities contract where the applied value-added tax rate is zero for both the RAH and TSC sectors combined, and, only the OSR sector has a positive value-added tax rate of 5.83% decreases its import quantity by no more than -0.03% across the value-added tax and lump-sum tax replacements.[243] The import quantity movements are parallel to the European Union import quantity shifts, but are not as pronounced for the same reason cited above. Thus, the movement of import quantities increases the overall value-added tax rate revenue, but by a lesser amount as experienced in the European Union simulation set.

Focusing on the import quantity shifts again, the tariff revenue increases as well. For the increases in the OAG, SMI, EPZ, and the OMA sectors, these sectors also have applied tariff rates of 9.77%, 10.00%, 2.91% and 7.60% respectively. On the other hand, decreases in import quantities occur in the Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors where the only positive tariff rate sector, the OSR sector, decreases by –0.03% and –0.02% for the value-added and lump-sum tax replacement respectively.[244] And, the decreases only occur in sectors that are 14.72% of the total updated benchmark import quantity of 78.5 billion rupees. Again, the revenue change is smaller in the U.S. case than in the EU case because less of the total export quantity is being impacted by the U.S. sugar price change than in

[242] The share totals by sector are the Author's calculations from the simulation results.
[243] Again the EPZ sector's import quantity increase of 82 million rupees at a 9.37% value-added tax levy more than adequately covers the OSR sector's decline that is less than 1 million rupees at 5.83%.
[244] For the tariff rates, refer to Table 9. However, the OSR sector with an applied tariff rate of 10.00% has its import quantity decrease by –1 million rupees while the EPZ sector, even though it has a 2.91% tariff rate, the rate is applied to an import quantity increase of 168 million rupees. Thus, the negative revenue change is contained by the increase in the EPZ sector alone.

the EU case. Thus, the tariff revenues increased because of the import quantity shifts in the economy, but by a smaller amount than in the EU scenario.

Likewise, the lump-sum taxation falls by -0.68 billion rupees. This too is a direct result of the increasing output in the majority of the most heavily taxed sectors of the economy (Other Agriculture, Export Processing Zone Manufacturing, and Other Manufacturing sectors) and decreasing in sectors with smaller or no value-added tax rates levied on them (Sugarcane, Construction, Wholesale and Retail Trade, and Repairs, Restaurants and Hotels, and Transport, Storage and Communication sectors).[245] Also, the value-added tax revenue increases here because the Other Agriculture, Sugar Milling, Export Processing Zone Manufacturing, and the Other Manufacturing sectors all increase their import quantities, to which positive value-added tax rates are applied, while falling in the Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors, and only to which the Other Services sector has a positive applied rate.[246]

The lump-sum taxation also falls as a result of increasing tariff revenue. The tariff revenue increases because of increases in the Other Agriculture, Sugar Milling, Export Processing Zone Manufacturing, and Other Manufacturing sectors' imports, where all the sectors have positive tariff rates applied to them, and the decreases that occur in the RAH, TSC, and OSR, where the OSR sector is the only sector that has a positive tariff rate, but only incurs small decreases in its import quantities.[247] So again, due to increased value-added and tariff revenues, the total lump-sum tax fell by -0.68 billion rupees to account for the changes. All in all, the

[245] The output quantity increase of 229 million rupees for the EPZ sector at an applied value-added tax rate of 9.37% overshadows the OSR sector's decrease of –14 million rupees at an applied rate of 5.83%.
[246] The EPZ sector's import quantity increase of 168 million rupees at 9.37% outweighs the –1 million rupees decrease at 5.83% in the OSR sector alone.
[247] The 16 million rupee increase in the OMA sector has an applied tariff rate of 7.60% covers the less than 1 million rupees change in the OSR sector, which has an applied tariff rate of 10.00% in addition to the 82 million rupees increase in the EPZ sector, which has an applied tariff rate of 2.91%.

value-added tax rates and lump-sum taxation adjusted downward to accommodate for increased revenues from the value-added and tariff taxation, as gleaned through the increases in output and imports in sectors that are the most heavily taxed in the economy coupled with decreases in the output and imports in the least heavily taxed sectors.

In conclusion, welfare increases when the distortionary value-added tax is used to maintain the government deficit, while welfare decreases with the non-distortionary lump-sum taxation is applied to maintain the government deficit, differing from the EU scenario, but are still small in magnitude. Also, the real exchange rate is dependent on the tax replacement chosen, as with the European Union, and the magnitude of its change varies, based on the output, export and import volume changes, being small and positive in the value-added tax case and small and negative in the lump-sum tax case, with the latter being equivalent to zero. Lastly, the value-added tax rates and lump-sum tax adjust downward to accommodate for increased revenues from the value-added and tariff taxation, as gleaned through the increased output and imports in sectors that are most heavily taxed in the economy and the decrease in output and imports in the least heavily taxed sectors, parallel to the European Union simulation, but again with a smaller adjustments overall.

3.3.5 Economic Effects of the Mauritius Sugar Export Price Reduction by the United States on Labor and Capital Prices

The United States' reduction of the price it pays for sugar exports originating from Mauritius also affects the wages of skilled and unskilled laborers as well as the rental rate of capital in the Mauritian economy. Table 20 displays the simulated effects of the reduction in the

U.S. price for Sugar Milling's sugar exports from 1.85 to 1.00 on factor prices with value-added tax replacement and lump-sum tax replacement.

Table 20: Economic Effects of the United States Sugar Price Reduction on Factor Prices (Percentage Change from Updated Benchmark)[248]

Variables	45% Decrease in Mauritius Sugar Export Price for the United States with Value-Added Tax Replacement	45% Decrease in Mauritius Sugar Export Price for the United States with Lump-Sum Tax Replacement
Skilled Labor Wage (SLW)	0.88	0.01
Unskilled Labor Wage (ULW)	0.94	-0.04
Rental Rate of Capital (ROC)	0.88	0.01
SLW/ULW*	-0.06	0.05
ROC/ULW**	-0.06	0.05

***** SLW/ULW is defined as the percentage change in the relative factor prices or rather the percentage change in the skilled labor wage less the percentage change in the unskilled labor wage.
**ROC/ULW is defined as the percentage change in the relative factor prices or rather the percentage change in the rental rate of capital less the percentage change in the unskilled labor wage.

This table reveals many things concerning the factor price adjustments. Here, the skilled labor wage increases in both cases, with the value-added tax and lump-sum tax replacement. The skilled labor wage is augmented by output shifts in the economy. The sectors with increased output volume for the value-added tax case are the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, the Electricity, Gas, and Water, and the Other Services sectors. But, from Section 3.3.1., it is clear the EPZ sector has the only significant absolute change in output quantity, and, with skilled sectoral employment changes, the largest and by far the most important shift occurs in the EPZ sector, with a 15 million rupees change for the value-added tax replacement, albeit a smaller adjustment than in the EU price cut scenario. Other

[248] Due to the normalization by the price of consumption, the levels are not comparable across runs. However, the sign of the price changes matters as well as the relative wage changes themselves, where the latter is comparable across simulation runs.

absolute changes in skilled employment are at the most 3 million rupees large, but since all the other sectors listed above have a bearing on the skilled labor wage, each sector will be discussed below, starting with the EPZ, EGW, OMA, and OSR sectors, in order of magnitude.

The Export Processing Zone Manufacturing sector increases its output by 0.62% (see Section 3.3.1). The relevance here is that the EPZ sector is the second largest consumer of labor in the economy and even though it is unskilled labor heavy, the 24.24% of skilled labor that it does demand for production will cause the wage rate of the skilled labor to rise (see Table 10) as previously stated. The skilled labor wage increases by the Electricity, Gas, and Water sector's output increasing by 0.73%, the largest percentage output increase of all the sectors for the value-added tax case. The EGW sector has a tremendous bearing on the skilled labor wage since 60.47% of its labor force is skilled labor and the average share of skilled labor for the economy is 42.59%.[249] Thus, the Electricity, Gas, and Water sector's skilled labor force composition is well above the economy's average and thus its increase in output puts upward pressure on the skilled labor wage as well.

The Other Manufacturing sector, although it is primarily comprised of unskilled labor, the amount of skilled labor it demands, because 24.24% of its labor force is skilled, also causes the wage to rise. The motivating factor is that the output increase in the OMA sector is the second largest absolute change in the updated benchmark, which spawns the 2 million rupees increase in its skilled labor demand. Lastly, the Other Services sector's skilled labor demand increase puts upward pressure on the skilled labor wage. The Other Services sector is labor-intensive and has a labor force that is 70.89% unskilled. The output volume increase translates

[249] Author's calculations from the economy-wide labor force.

into a 1 million rupees increase in skilled labor demand for the sector.[250] Therefore, the skilled labor wage increases because of the output quantity increases in the Export Processing Zone Manufacturing sector, the Electricity, Gas, and Water sector, the Other Manufacturing sector, and the Other Services sector, in order of magnitude.

For the lump-sum tax replacement, skilled labor wage increases as well. In this case, the Other Agriculture, Export Processing Zone Manufacturing, and the Other Manufacturing sectors output volumes expand. The Other Agriculture and Other Manufacturing sectors only exhibit increases in skilled labor demand that are less than 1 million rupees. However, the Export Processing Zone Manufacturing sector, which still has the largest absolute labor demand change, increases by 9 million rupees.[251] Thus, the skilled labor wage rises, regardless to whether the value-added or lump-sum tax replacement is used, and is contingent on output quantity changes of the OAG, EPZ, OMA, EPZ, and the OSR sectors.

Another interesting facet of Table 20 is that the unskilled labor wage rises by 0.94% with value-added tax replacement and falls by –0.01% in the case of lump-sum tax replacement. This change in sign is not an odd occurrence. Again, as with skilled labor, the output quantity changes influence the overall changes in the unskilled labor wage. In the value-added tax case, the Export Processing Zone Manufacturing sector has the most substantial unskilled labor employment change of 47 million rupees in the value-added tax case. The Export Processing Zone Manufacturing sector has the second largest output increase of 0.62%, and, as previously mentioned, has the second largest demand for labor in the economy. However, 76.76% of the EPZ sector's labor force is unskilled and the proportion of unskilled laborers in its labor force far

[250] For percentages of skilled and unskilled labor by sector, please see Table 10 in Chapter 2. The absolute changes in sectoral employment are the Author's calculations from the simulation results.
[251] The absolute changes in the skilled labor demand are the Author's calculations from the simulation results.

exceeds the 57.41% economy-wide average. Thus, we expect the increase in the output volume of the Export Processing Zone Manufacturing sector to have a substantial influence on the unskilled labor wage not only because of the absolute labor demand of the sector, but also because of the percentage of its labor force that is unskilled.

The next closest increase in unskilled labor demand is in the Other Manufacturing sector at 5 million rupees. The significance here is that the OMA sector has a labor force that is largely unskilled, and, incurs the second largest absolute change in output. Again, the share of unskilled laborers in its labor force exceeds the 57.41% average of the economy. Thus, the Other Manufacturing sector's output volume increase exerts upward pressure on the unskilled labor wage. Furthermore, the OAG sector is capital-intensive, but within its labor force, it is 90.66% unskilled labor. This unskilled labor force share of the total labor force in the Other Agriculture sector is greater than the 57.41% unskilled labor average in the economy, and thus its output quantity increase places upward pressure on the unskilled labor wage. It demands 1 million rupees more of unskilled labor. Furthermore, the EGW sector, even though it is capital-intensive, has a labor force that is 39.53% unskilled. And, given its percentage output increase, a 1 million rupees increase in unskilled labor is induced. Hence, the labor demand for unskilled labor increases with the value-added tax replacement primarily because of the output quantity changes in the Export Processing Zone Manufacturing sector and, to a smaller degree, in the Other Manufacturing, Other Agriculture, and the Electricity, Gas, and Water sectors.

In the lump-sum case, the magnitude of the input price change falls drastically. The unskilled labor wage falls by –0.04%. But, in this scenario, the Other Agriculture sector, the Export Processing Zone Manufacturing sector, and the Other Manufacturing sector do have output quantity increases. The Other Agriculture sector demands an additional l million rupees

of unskilled labor. The EPZ sector still dominates, in terms of the change, but only exhibits an output quantity increase of 0.35% (see Section 3.3.1.). As a result, the sector demands 30 million rupees more unskilled laborers in this case. The Other Manufacturing sector increases its demand for unskilled labor by 1 million rupees in the lump-sum tax case. But, increases in the unskilled labor demand also occur in the Construction and the Wholesale and Retail Trade and Repairs sector of 1 million rupees as well.[252]

These increases occur while decreases occur in the Sugarcane, Sugar Milling, Restaurants and Hotels, and the Transport, Storage, and Communication sectors. The Sugarcane sector, which is a labor-intensive sector, suffers an output volume loss of –3.71%. Even though it is the sixth largest consumer of labor in the economy, the SUG sector's labor force is 90.66% unskilled, where the proportion of the unskilled laborers is much greater than the economy's average of 57.41%.[253] It incurs a contraction its absolute labor demand of –26 million rupees in the lump-sum tax case. The unskilled labor demand contracts by –5 million rupees in the Sugar Milling sector. Also, the Restaurants and Hotels and the Transport, Storage, and Communication sectors contract by 1 million rupees.[254] Thus, the unskilled labor wage falls in the lump-sum tax case because of the output quantity increases in the Other Agriculture, Export Processing Zone Manufacturing, and the Other Manufacturing sectors do not place enough upward pressure on the unskilled labor's wage to outweigh the downward pressure on the unskilled labor wage by the Sugarcane, Sugar Milling, Restaurants and Hotels, and the Transport, Storage, and Communication sectors and the unskilled labor wage falls.

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[252] The absolute unskilled labor force changes are the Author's calculations from the simulation results.
[253] The average share of the labor force that is unskilled is Author's calculations. And, for the percentage of the unskilled labor force by sector, please refer to Table 10.
[254] The sectoral employment changes are the Author's calculations from the simulation results. Please note that the Wholesale and Retail Trade and Repairs difference from the value-added tax to the lump-sum tax replacement is 14 million rupees higher, the Transport, Storage, and Communication sector is 9 million rupees higher, and the Restaurants and Hotels sector is 1 million higher.

Moreover, the rental rate of capital increases across the value-added and lump-sum taxation. In the value-added tax case, this is credible even though the Sugar Milling sector is slightly more capital- than labor-intensive because the increases in output volume that occur in the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sectors occur in sectors that are capital-intensive. They are 29.04% of the total capital consumption in the economy, but are over half of the total output quantity in the updated benchmark, so changes in the sectoral output matters for capital demand. The largest increase in capital deployment occurs in the EPZ sector at 73 million rupees. This is followed by a 16 million increase in the Other Manufacturing sector. And, the EGW sector demands an additional 5 million rupees of capital inputs. Also, the Other Agriculture sector increases its capital demand by 4 million rupees.[255] Thus, one would expect the rental rate of capital to increase because of the increased output in the capital-intensive sectors.

In the lump-sum tax case, the Other Agriculture, Export Processing Zone Manufacturing, and the Other Manufacturing sectors' output volumes expand. But now the additional demand for capital is 1 million rupees for the OAG sector and 37 million rupees for the EPZ sector. Thus, with increased output volume in the Other Agriculture, Export Processing Zone Manufacturing, and the Other Manufacturing sectors across both tax replacements, and the Electricity, Gas, and Water (for the value-added tax case only), there is increased demand for the intensively used factor in these sectors, capital, driving up the capital price in both cases.

Assessing the relative factor price changes, the unskilled laborers are better off than the skilled laborers and the capitalists in the value-added tax case, but are not better off than those inputs in the lump-sum tax case. The percentage change of the ratio skilled labor wage

[255] The absolute changes in capital demand are the Author's calculations from the simulation results.

percentage change to the unskilled labor wage percentage change and the rental rate of capital percentage change to the unskilled labor wage percentage change is --0.06%. Thus, the unskilled laborer is slightly better off than the skilled laborer or the capitalist. However, in the lump-sum tax case, the unskilled laborer is actually worse off than either the skilled laborer or the capitalist, reflecting ratios of 0.05%. Hence, the unskilled laborers are marginally better off than the skilled laborer or capitalist in the value-added tax case, but are marginally worse off in the lump-sum tax case.

In conclusion, the skilled labor wage rises regardless to the tax replacement. In the value-added tax case, the wage is driven up by the increase in output quantities in the Export Processing Zone Manufacturing, Electricity, Gas, and Water, Other Manufacturing sector, and the Other Services sectors. In the lump-sum tax case, the skilled labor wage rate increases because of increases in output volume of the EPZ sector. Second, the unskilled labor's wage is dependent on the tax replacement chosen, reflecting an increase in wages with the value-added tax replacement, but a decline in the case of lump-sum tax replacement. In particular, it is the OAG, EPZ, and the OMA sectors having labor forces that are primarily unskilled labor, the EGW sector having a labor force that is primarily skilled, but still having some unskilled labor demand that increases the unskilled labor wage. The decrease occurs in the lump-sum tax case because the upward pressure on the unskilled labor wage from increased demand by the OAG, EPZ, OMA, CON, and the WRT sectors is outweighed by the downward pressure on the wage by unskilled labor demand contractions in the SUG, SMI, RAH, and the TSC sectors. Lastly, the rental rate of capital in the value-added tax case is augmented by output volume increases in the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sectors because the increase in output requires increased factor usage

of their intensively used factor, capital. The increase in capital price in the lump-sum tax case is the direct result of output increases in the OAG and the EPZ sectors. Lastly, relative wage movements reflect that the unskilled laborer is better off than either the skilled laborer or the capitalist in the value-added tax case, but worse off in the lump-sum tax case.

3.4 59% MAURITIUS SUGAR EXPORT PRICE REDUCTION BY THE EUROPEAN UNION AND A 45% MAURITIUS SUGAR EXPORT PRICE REDUCTION BY THE UNITED STATES

Given the potential of both preferential pricing agreements to be removed by the European Union and the United States, it is important to simulate the change in the sugar export price for Mauritius decreasing to the world price for both the European Union and the United States jointly. The change in Mauritius' sugar export price for the European Union and the United States will cause the output quantities, export quantities, import quantities, welfare, foreign exchange rate, value-added tax rate, lump-sum taxation, and the factor prices to change.[256] Thus, this section reports the changes in each of the aforementioned variables to reveal the economic effects of the European Union and the United States decreasing their prices from 2.44 and 1.85 times the world price respectively to the world price of one simultaneously.

[256] All percentage changes are from the updated benchmark economy, or updated benchmark, which is inclusive of the tariff changes that occur from 1997-2000 and the introduction of the value-added tax in 1998, with constant indirect taxes net of subsidies rates.

3.4.1 Economic Effects of the Mauritius Sugar Export Price Reductions by the European Union and the United States on Output Volumes by Sector

The cut in the prices paid for the Mauritius's sugar exports by the European Union and the United States will affect the output quantities in each sector. Therefore, Table 21 details the economic effects of the sugar price reductions on output quantity with value-added tax replacement and lump-sum tax replacement.

Table 21: Economic Effects of the Joint Sugar Price Reductions on Output Quantity by Sector (Percentage Change from Updated Benchmark)

Variables	59% and 45% Decrease in Mauritius Sugar Export Price for the European Union and United States Respectively with Value-Added Tax Replacement	59% and 45% Decrease in Mauritius Sugar Export Price for the European Union and United States Respectively with Lump-Sum Tax Replacement
Sugarcane	-65.17	-65.28
Other Agriculture	1.40	1.25
Sugar Milling	-61.87	-61.99
Export Processing Zone Manufacturing	6.53	6.23
Other Manufacturing	0.41	0.08
Electricity, Gas, and Water	0.49	-0.29
Construction	-0.02	-0.02
Wholesale and Retail Trade and Repairs	-1.16	-0.43
Restaurants and Hotels	-2.16	-1.69
Transport, Storage, and Communication	-2.57	-2.02
Other Services	-0.71	-0.77

There are many interesting results here. The Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas and Water (in the value-added tax replacement case only) sectors' output quantities increase. The largest percentage output volume expansions still occur in the Export Processing Zone Manufacturing and the Other Agriculture sectors, regardless of the tax replacement applied. And, in the EU price cut and the U.S. price cut simulations, this was the case as well. Also, as before, the Export Processing Zone Manufacturing sector incurs the largest absolute output volume change, with 4.3 and 4.1 billion rupees for the value-added tax and the lump-sum tax replacement.[257]

[257] The absolute output volume changes are the Author's calculations from the simulation results.

This is considerably larger than all other absolute increases that take place in the economy. A 45, 81, and 14 million rupees increase occurs in the Other Agriculture, Other Manufacturing, and the Electricity, Gas, and Water sectors respectively in the value-added tax case, and for the lump-sum tax case, 41 and 16 million rupees increase for the Other Agriculture and Other Manufacturing sectors respectively.[258] And, it is clearly evidenced that even though the Other Agriculture sector has the second largest output volume percentage change, it is only the second largest absolute change in the value-added tax case only, being a little over half of the absolute change found in the Other Manufacturing sector. Due to the small volume change of the Other Agriculture, Other Manufacturing, and the Electricity, Gas, and Water sectors, which the aggregate absolute change in these sectors are only 3.26% and 1.39% of the total absolute change in the EPZ sector in the value-added and the lump-sum tax scenarios respectively, they will not be discussed further.

For the Export Processing Zone Manufacturing sector, all previous arguments as to its prominence in the output volume change still apply here as well. The Export Processing Zone Manufacturing sector's output volume increases because of the relative wage of the unskilled labor falls relative to the skilled labor wage or the rental rate of capital (see Section 3.4.5.). In addition, as discussed in the EU and the U.S. price cut cases, the Other Manufacturing sector, which consumes 6.55% of the Export Processing Zone Manufacturing sector's total inter-industry output, output volume increases and thus increases its demand for the EPZ sector's output. Furthermore, the depreciation of the rupee in the value-added tax case favors the sector because it is a key exporter (see Section 3.4.4.). Lastly, in the value-added tax case, the value-added tax rate's downward scaling also favors the sector since the Export Processing Zone

[258] The EGW sector experiences an output quantity decline in the lump-sum tax case. All absolute output quantity changes are the Author's calculations from the simulation results.

Manufacturing sector has a high value-added tax rate levy (see Table 8 and Section 3.4.4.). These findings echo the European Union and United States cases, but the increases are more pronounced in the dual price cut than in any of the previously presented single cases. Thus, the Export Processing Zone Manufacturing and the Other Agriculture sectors have the largest percentage increases in output volume that are of an even greater magnitude than found in the EU price change or U.S. price change alone and with the Export Processing Zone Manufacturing sector having the only significant output volume increase in absolute terms as in the former two cases.

The Sugarcane sector and the Sugar Milling sector still reflect the most pronounced contractions of output quantity in percentage and absolute terms. The largest percentage decrease is in the Sugarcane sector, with –65.17% and –65.28% in the value-added and lump-sum tax replacement scenarios respectively. These output quantity percentage decreases translate into the largest absolute changes as well, equating to about a –1.1 billion decrease for each tax replacement case.[259] And, as before, the Sugarcane sector losses are indicative of the decrease in the output of the Sugar Milling sector, the only sector into which it sells its output in 1997. Also, as previously shown, the Sugar Milling sector exports 97.72% of its total sugar production in 1997.[260] Thus, it follows that the Sugar Milling sector would also experience large decreases in its export quantities because its export good suffered a 59% and 45% price cut from the two regions that make up 99.11% of its total exports.[261] And, it does, with percentage decreases of –61.87% for the value-added tax case and –61.99% in the lump-sum tax case. These percentage changes in the Sugar Milling sector equate to the second largest absolute

[259] The output quantity changes are the Author's calculations from the simulation results.
[260] The production that is exported is the Author's calculations from data from the Bank of Mauritius, 1998, p. 27.
[261] The export share totals by region are the Author's calculations from data from the Bank of Mauritius, 1998, p. 27.

decreases in output volume with –872 and –873 million rupees decrease in the value-added and the lump-sum tax case respectively.[262] The decreases are much more pronounced in the dual price reduction case than singularly, and, this is not atypical given that a greater portion of the total exports of the Sugar Milling sector is impacted by the price cuts. Still there appears to be a high output price elasticity of sugar in that the output volume of the Sugar Milling sector contracts so sharply.[263] Also, the complete removal of the preferential agreement for sugar greatly depresses the overall output for sugar, displaying the importance of the preferential pricing agreement for sugar production.[264] Hence, the Sugarcane and the Sugar Milling sectors suffer the sharpest contractions in overall output volumes, in percentage and absolute changes, exceeding the decreases presented in the European Union and United States singular cases.

All in all, the Export Processing Zone Manufacturing and the Other Agriculture sectors experience the most sizable percentage increases in output, but with an even greater magnitude than just the EU price change or U.S. price change alone produced, but only the Export Processing Zone Manufacturing sector has the largest and most significant absolute change, which is also larger than the former two simulation sets. Furthermore, the Sugarcane and Sugar Milling sectors suffer the sharpest percentage and absolute declines in output quantity, but in excess of the decreases displayed through the European Union and the United States' simulation results.

[262] The absolute quantities reported above are the Author's calculations from the simulation results.
[263] Taylor, Yúnez-Naude, and Hampton, 1999, p. 463.
[264] See Nielsen, 2003, p. 21.

3.4.2 Economic Effects of the Mauritius Sugar Export Price Reductions by the European Union and the United States on Export Volumes by Sector

The price reductions in the European Union and the United States jointly for the sugar exports flowing from Mauritius also induce export quantity changes by sector. Table 22 displays the economic effects of these preferential price removals from sugar exports by the European Union and the United States with value-added tax and lump-sum taxation replacement. It is as follows:

Table 22: Economic Effects of the Joint Sugar Price Reductions on Export Quantity by Sector (Percentage Change from Updated Benchmark)

Sectors*	**59% and 45% Decrease in Mauritius Sugar Export Price for the European Union and United States Respectively with Value-Added Tax Replacement**	**59% and 45% Decrease in Mauritius Sugar Export Price for the European Union and United States Respectively with Lump-Sum Tax Replacement**
Other Agriculture	1.47	1.30
Sugar Milling	-94.94	-94.95
Export Processing Zone Manufacturing	6.57	6.28
Other Manufacturing	-0.12	-0.47
Electricity, Gas, and Water	0.30	-0.51
Wholesale and Retail Trade and Repairs	-1.35	-0.68
Restaurants and Hotels	-2.28	-1.84
Transport, Storage, and Communication	-2.74	-2.23
Other Services	-0.95	-1.08

*Only the sectors with positive export volumes are recorded in this table. Therefore, the Sugarcane and the Construction sectors are not included here. Also, the Electricity, Gas, and Water sector would not have any positive export volume had it not been assigned an amount through the application of the calculated supply shares to the exports of goods and services, a mechanism which is applied to usage values to ensure the share of production of a composite good is assigned to each producer of that good, because it is applied to final demand values as well.

The export quantity changes in the table reveal some interesting attributes concerning the feedback in the Mauritian economy. First, the Other Agriculture and Export Processing Zone Manufacturing sectors are the only sectors with positive changes in export quantity for both value-added tax replacement and lump-sum tax replacement, while the export quantity increases for the Electricity, Gas, and Water sector in the value-added tax case, just as in the European Union and United States price change cases. In this case, the largest percentage increases produce the largest export volume increases. Thus, the 6.57% and 6.28% increases in the EPZ sector's export volume across both tax replacements amounts to a 3.9 and 3.7 billion rupees increase in the value-added and lump-sum tax case scenarios respectively. And, even though the Other Agriculture sector has a 1.47% and 1.30% increase for the value-added and lump-sum tax replacement, it is only about a 7 million rupees increase in absolute terms. The Electricity, Gas, and Water increase in the value-added tax case is only thousands of rupees large.[265] Thus, the EPZ sector is the only sector with substantial export volume changes and will be the only sector addressed in detail.

The Export Processing Zone Manufacturing sector, as previously argued, the export quantity change is indicative of the output quantity change experienced by each sector because it is the largest export sector in the Mauritian economy in 1997 benchmark at 44.7% of the total export value in that year, exporting 87.9% of its total domestic supply, but is 79.86% of the total export value in the updated benchmark or 80.95% of the total export quantity.[266] Thus, the export quantity percentage increases are largest for the Other Agriculture and Export Processing Zone Manufacturing sectors, reflecting greater increases than in the European Union or the

[265] Author's calculations of the total difference are from the simulation results.
[266] Please see the Benchmark Output and Trade Shares table in Chapter 2 for the Author's calculations of the EPZ sector's share of total exports, the share of export value, and the share of export quantity in the updated benchmark is the Author's calculation from the simulation results.

United States' sugar price cut scenario, but the absolute change is only significant for the EPZ sector, as in the prior two cases.

Furthermore, the export quantities decrease in the Sugar Milling, Other Manufacturing, Electricity, Gas, and Water (in the lump-sum tax replacement case only), Wholesale and Retail Trade and Repairs, Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors. Of the percentage decreases, the Sugar Milling, Transport, Storage, and Communication, and Restaurants and Hotels sectors experience the largest percentage declines. But, as in the EU and U.S. preferential price removal cases, the Sugar Milling sector dominates the export quantity change in absolute terms with –685 million rupees for both the value-added and lump-sum tax cases. This is in light of the next closest absolute decline in export quantity of –98 million and –80 million rupees in the Transport, Storage, and Communications sector. I will only address the former.

As before, the Sugar Milling sector decline is a direct result of the sugar export price decreasing for this sector. These decreases directly echo the two previous sets of simulations for the European Union and the United States respectively. But, the magnitude of the decreases is more pronounced in the case of the dual price changes. Again, this is logical given the export price was adjusted for 99.11% of the total sugar exports, causing greater shifts to occur throughout the economy.[267] Therefore, the Sugar Milling, Transport, Storage, and Communication, and the Restaurants and Hotels sectors suffer the largest percentage declines, where the absolute decreases are substantial in the Sugar Milling sector only, and these percentage and absolute declines are greater than in either of the two cases where the price of sugar exports was cut individually.

[267] The share of total sugar exports by region are the Author's calculations from the Bank of Mauritius, 1998, p. 27.

All in all, the largest export quantity percentage increases occur in the Other Agriculture and Export Processing Zone sectors, reflecting greater increases than in the European Union or the United States' sugar price cut scenarios. But, the Export Processing Zone Manufacturing sector again dwarfs the absolute quantity change in the export volume by over 3.7 billion rupees across both tax replacement scenarios, thereby producing the only significant export volume change. Furthermore, the Sugar Milling, Transport, Storage, and Communication, and the Restaurants and Hotels sectors suffer the largest percentage declines in export quantity, and, these declines are greater than either of the two simulation cases where the price of sugar exports was cut for either the EU or the U.S. respectively. However, the Sugar Milling sector is the only sector with a substantial absolute export volume decrease, far outstripping the declines that took place in other sectors.

3.4.3 Economic Effects of the Mauritius Sugar Export Price Reductions by the European Union and the United States on Import Volumes by Sector

The sugar price reduction for the European and the United States concurrently also affects the import quantities by sector. In Table 23, the effects of the 59% decrease in the Mauritius sugar export price by the EU and the 45% decrease in the price of the Mauritius sugar export price by the U.S. for value-added tax replacement and lump-sum tax replacement will be presented. Table 23 is as follows:

Table 23: Economic Effects of the Joint Sugar Price Reductions on Import Quantity by Sector (Percentage Change from Updated Benchmark)

Sectors*	**59% and 45% Decrease in Mauritius Sugar Export Price for the European Union and United States Respectively with Value-Added Tax Replacement**	**59% and 45% Decrease in Mauritius Sugar Export Price for the European Union and United States Respectively with Lump-Sum Tax Replacement**
Other Agriculture	1.33	1.19
Sugar Milling	41.20	40.73
Export Processing Zone Manufacturing	5.67	5.32
Other Manufacturing	1.12	0.81
Restaurants and Hotels	-1.52	-0.83
Transport, Storage, and Communication	-2.32	-1.69
Other Services	-0.41	-0.40

*Only the sectors with positive import volumes are recorded in this table. Therefore, the Sugarcane, Electricity, Gas and Water, Construction, and the Wholesale and Retail Trade and Repairs sectors are not included here.

There are several notable facts reflected through this table. First, the Other Agriculture, Sugar Milling, Export Processing Zone Manufacturing, and the Other Manufacturing sectors all experience increases in their import quantities of 1.33%, 41.20%, 5.67%, and 1.12% respectively for the value-added tax replacement and 1.19%, 40.73%, 5.32%, and 0.81% respectively for the lump-sum tax replacement. The Sugar Milling and the Export Processing Zone Manufacturing sectors incur the largest percentage changes, regardless of the tax replacement instrument. But, the Sugar Milling, Export Processing Zone Manufacturing, and the Other Manufacturing sectors all experience sizable changes in their absolute import volumes with a 221 and 219 million rupees change, a 1.5 and 1.4 billion rupees change, and a 408 and 294 million rupees change in

the value-added and lump-sum tax replacement scenarios for each sector respectively.[268] Thus, all three sectors will be expounded upon.

As before, the Sugar Milling sector's import volume changes are not excessive given the initial amounts imported by the European Union and the Southern African Customs Union are small and that it still supplies the domestic market while sharply decreasing its production, thus the imports of sugar are necessary to meet the domestic demand, as in previous cases. Furthermore, as previously mentioned, the Export Processing Zone Manufacturing sector, since it is the second largest import sector in the economy, as it increases its output, one would expect this to filter through to the import quantity it demands. Also, as previously stated, the Other Manufacturing sector actually imports 1.560 times its domestic supply.[269] Thus, one would assume that with an output quantity increase, import quantities for this sector would rise as well (i.e. more imported inputs are needed to produce more output).

The import quantities are reminiscent of the European Union and United States simulation cases. However, the changes outweigh the changes exhibited in either of the price cut scenarios in isolation. Again, the greater import quantity change follows from 99.11% of the total sugar exports being affected by a price cut since more pronounced changes in output occur, further adjusting both import and export quantities by a larger magnitude.[270] All in all, the percentage change in import quantities increase most sharply for the Sugar Milling and Export Processing Zone Manufacturing sectors, while significant absolute increases occur in the Sugar Milling, Export Processing Zone Manufacturing and the Other Manufacturing sectors, all to a greater extent than as seen in the EU price cut or U.S. price cut scenarios in isolation.

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[268] The absolute differences in the import quantity are the Author's calculations from the simulation results.
[269] Please see Author's calculations as reported in Table 4 of Chapter 2.
[270] The share of total sugar exports by region are the Author's calculations from the Bank of Mauritius, 1998, p. 27.

Another notable facet of the Mauritian economy is that the Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors all have their import quantities decline for the value-added and the lump-sum tax replacement. The sectors that suffer declines in import quantities here are the same sectors that contract in the European Union and the United States' simulation scenarios. Of the declines, the largest import quantity percentage decreases are in the Transport, Storage, and Communication sector and the Restaurant and Hotels sector. But, the largest absolute change, which overshadows the other two changes, occurs in the Transport, Storage, and Communication sector. Hence, the TSC sector will be discussed. The TSC sector incurs a –112 million import quantity decrease in the value-added tax case and a –82 million import volume decrease in the lump-sum tax case. In the Transport, Storage, and Communication sector, the import needs of the sector declines from the Sugarcane and Sugar Milling output quantity declines that depress its own output quantity as in the prior two simulation sets (see Sections 3.2.3 and 3.3.3.).

But, as with the discussion of the import quantities that increase in the dual price case increasing by more than in either of the price cut cases in isolation, the import quantities that decrease are larger in magnitude as well, adjusting to the larger output quantity contractions in the RAH, TSC, and OSR sectors. Thus, the Transport, Storage, and Communication sector has the largest overall percentage and absolute decrease in import quantity, decreasing its overall import quantities by more than the preferential price removal in the European Union and the United States ever produced singularly, although the Restaurants and Hotels and the Other Services sectors incur decreases in their import quantities as well.

In conclusion, the import quantities' percentages increase most sharply for the Sugar Milling and Export Processing Zone Manufacturing sectors, but sizable absolute increases occur

in the Sugar Milling, Export Processing Zone Manufacturing, and the Other Manufacturing sectors. The import quantities increase to a greater extent than as seen in the EU price cut or U.S. price cut cases. Moreover, the Restaurants and Hotels and the Transport, Storage, and Communication sectors exhibit the largest overall import quantity percentage decreases, but that the Transport, Storage, and Communication sector suffers the largest and only significant export volume decrease in percentage and absolute terms. The import quantity decreases are larger by more than the preferential price removal of sugar exports by the European Union or the United States ever produced singularly, in both percentage and absolute terms.

3.4.4 Economic Effects of the Mauritius Sugar Export Price Reductions by the European Union and the United States on Welfare, Foreign Exchange, and the Replacement Taxes

As in the two previous cases for sugar export price changes for the European Union and the United States singularly, there are economic repercussions that arise from the dual adoption of the world price by the European Union and the United States, namely there are effects on welfare, the real foreign exchange rate, the value-added tax rate, and the lump-sum tax. Table 24 reports how the dual price reduction affects welfare, foreign exchange, and the replacement taxes for the value-added and lump-sum tax replacements.

Table 24: Economic Effects of the Joint Sugar Price Reductions on Welfare, Foreign Exchange, Value-Added Tax Rate, and Lump-Sum Taxation (Percentage Change from Updated Benchmark Except Lump-Sum Tax)

Variables	**59% and 45% Decrease in Mauritius Sugar Export Price for the European Union and United States Respectively with Value-Added Tax Replacement**	**59% and 45% Decrease in Mauritius Sugar Export Price for the European Union and United States Respectively with Lump-Sum Tax Replacement**
Welfare	-0.03	-0.32
Foreign Exchange Rate (e)*	0.78	-0.18
Value-Added Tax Rate	-20.34	-
Lump-Sum Tax (Billions of Rupees)	-	-0.72

*e is defined as Rupees per Foreign Currency.

There are several important effects that appear in the table above. First, the welfare effects are negative, regardless to the tax replacement chosen. One can assume that the terms of trade effect, as discussed in Section 3.2.1., dominates the economy, despite the reallocation of resources increasing output, exports, and imports to certain sectors. However, it is interesting to note that magnitude of the welfare change varies across tax replacement types, where it is –0.03% under the value-added tax replacement, but is –0.32% with lump-sum tax replacement. Theory of the second best would lend credence to this, given that a price distortion was removed and for the revenue changes that took place another distortion, this time a distortionary value-added tax, was adjusted to ensure revenue neutrality. It suggests that the negative terms of trade effects are damped by the adjustment of the value-added tax.

Also, from the European Union and the United States, we know for value-added tax replacement, the welfare moves in opposite directions. The EU preferential price change causes welfare to fall because of the negative terms of trade movement on a key export sector. But, the United States preferential price removal displays an increase in welfare which also accounts for

the reallocation of resources, namely factor inputs, to places in which greater marginal productivity exists, boosting welfare. The EU effects dominate, but the U.S. effects are still operative. Thus, the negative terms of trade effects dominate the reallocation of resources effects from the dual price reduction, causing the equivalent variation as a percentage of updated gross domestic product to fall in both tax replacement scenarios, but to a greater extent in the case of lump-sum tax replacement.

Overall, the welfare effects are minute. However, as previously discussed in Section 3.2.4, the full-blown effects of the sugar export price changes may be damped because of the counterfactual economy from which all simulations are run. The 1997 benchmark economy is updated by incorporating the tariff rate changes that occur from 1997-2000 and the introduction of the value-added tax, while maintaining the indirect taxes net of subsidies rates. The updated benchmark, which reflects these changes, causes the Sugar Milling sector to fall from 14.0% of the total export value in the 1997 benchmark to 2.32% of the total export value in the updated benchmark. So, the welfare changes should be approached with caution as they may be understated.

Second, the real foreign exchange rate varies, increasing by 0.78% with the value-added tax replacement, and decreasing by –0.18% with the lump-sum tax replacement. In the value-added tax replacement case, the depreciation of the rupee occurs. But, since the value-added tax is applied to imports as well as output, a decrease in the value-added tax rate increases import demand relative to export supply, causing the real exchange rate to rise. In the cases of non-distortionary tax replacement, the real foreign exchange rate falls. The decrease is driven by the export and the import values' total aggregate sum decreasing slightly. This is closely reflective of the real foreign exchange rate percentage changes of 0.79% and –0.17% for the European

Union and 0.91% and –0.01% for the United States for value-added tax replacement and the lump-sum tax replacement respectively. However, the European Union effects tend to outweigh the United States effects. And, again this is logical given that the sugar price change for the European Union affects 95.34% of the total exports while the United States price cut only affects 3.77% of the total exports.[271] Thus, the real exchange rate depreciates in the value-added tax case and appreciates minutely in the lump-sum taxation case, mirroring the EU and U.S. cases.

Another striking characteristic presented in Table 24 pertains to the tax adjustments. The value-added tax rate as well as the lump-sum taxation adjusts downward to maintain government revenues. In the dual price case, the value-added tax rate falls by -20.33%. And, as previously mentioned, in the value-added tax case, the necessity to decrease the total value-added tax stems from increases in the output quantities for the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sectors, all of which have positive value-added tax rates of 3.52%, 9.37%, 9.50%, and 10.00% respectively, which equates to higher revenues per sector. This increased output in the highly taxed sectors of the value-added tax is coupled with the decrease in the least heavily taxed sectors of the value-added tax levy, namely Sugarcane (0.00%) value-added tax rate, Construction (0.00%), Wholesale and Retail Trade and Repairs (0.00%), Restaurants and Hotels (0.00%), Transport, Storage, and Communication (0.00%), and Other Services sector (5.83%), leading to more revenue gleaned from value-added taxation itself.[272]

In addition, the increased import quantities in the Other Agriculture, Sugar Milling, Export Processing Zone Manufacturing, and Other Manufacturing sectors cause the value-added

[271] The share of total sugar exports by region are Author's calculations from the Bank of Mauritius, 1998, p. 27.
[272] The 4.3 billion rupees increase in the Export Processing Zone Manufacturing sector at an applied value-added tax rate of 9.37% adequately covers the revenue loss that occurs from the –217 million rupees decrease in output quantity at an applied rate 5.83% in the Other Services sector.

tax revenue to rise. First, the sectors that increase its imports have been shown to have positive value-added tax rates applied to them (3.52%, 10.00%, 9.37%, and 9.50% respectively), where OAG, SMI, EPZ, and OMA, have import quantity increases of no less than 0.81% and a maximum of 41.20% across both tax replacements. Likewise, the decrease in import quantities occur in the Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors, where the Restaurants and Hotels and the Transport, Storage, and Communication sectors have a zero value-added tax rate applied to them, and the Other Services sector, the only sector that contracts and has a positive value-added tax rate of 5.83%, only contracts by about –0.40% in each tax replacement case.[273] Therefore, value-added tax revenue increases from the import quantity movements.

The value-added tax rate is scaled downward because of the tariff revenue increases as well. The tariff revenue rises for the Other Agriculture, Sugar Milling, Export Processing Zone Manufacturing, and Other Manufacturing sectors because of the increase in import quantities. The OAG, SMI, EPZ, and OMA sectors have an average tariff levied on their imports of 9.77%, 10.00%, 2.91%, and 7.60% respectively. Of the contracting import quantity sectors, RAH, TSC, and OSR, only the OSR sector has a non-zero tariff rate of 10.00%.[274] Thus, tariff revenue rises as well.

In the dual price case, the value-added tax rate falls by -20.33% just as it falls by -20.28% and -19.34% in the case of the European Union and the United States preferential price removal respectively (see Sections 3.2.4 and 3.3.4). Hence, the value-added tax rates are scaled

[273] The OSR sector's import quantity decrease is –19 million rupees and the sector has an applied rate of 5.83%. But, the EPZ sector's import quantity increases by 1.5 billion rupees and the sector's value-added tax rate is 9.37%. Thus, the negative movement in revenue through the OSR sector's movements is outweighed by the positive gains in revenue from the EPZ sector.

[274] Here, the revenue change from the Other Services sectoral decrease of –19 million rupees at a 10.00% tariff rate is covered by the Sugar Milling sector's increase of 221 million rupees at an applied rate of 10.00%.

downward because of increases in the revenues of the value-added tax and tariff revenues due to increases in the output and imports in the most heavily taxed sectors and decreases in output and imports in the least heavily taxed sectors, and decreases by a greater extent than with the EU or U.S. price cut scenarios.

In the lump-sum taxation case, the lump-sum tax falls by –0.72 billion rupees as well. The output in the same sectors increase, sans the Electricity, Gas, and Water sector, which suffers a slight decline in its output quantity in this tax case. Only the Sugar Milling, Electricity, Gas, and Water, and the Other Services sectors (three of the seven sectors that decline in the lump-sum tax case) have positive applied value-added tax rates for the sectors with decreasing output quantities.[275] The import quantities that rise occur in the same sectors as in previous cases, namely the OAG, SMI, and the OMA sectors, while falling in the RAH, TSC, and the OSR sectors. It boosts the value-added tax revenue because the OSR sector is the only sector with a positive value-added tax rate, when all the sectors that increase have a positive value-added tax rate.[276] And, the tariff revenue increases because the import quantities rising in the OAG, SMI, EPZ, and the OMA sectors along with a decrease and import quantities in the RAH, TSC, and the OSR sectors because all the sectors that increase in quantity have positive rates applied to them and only the OSR sector has a positive rate and contracts.[277] Therefore, the lump-sum taxation decreases to accommodate for the increases in revenue from increases in the value-added tax and tariff revenues.

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[275] The Sugar Milling sector has an –873 million rupees output quantity decrease, the Electricity, Gas, and Water sector a –9 million rupees decrease, and the Other Services sector has an –237 million rupees decrease. The value-added tax rates across the sectors are 10.00%, 10.00%, and 5.83% respectively. However, the EPZ sector alone, with a 4.3 billion rupees increase and an applied value-added tax rate of 9.37% covers the revenue declines that occur in the Sugar Milling, Electricity, Gas, and Water, and the Other Services sectors.

[276] The revenue decrease in the Other Services sector from the import quantity decrease of –18 million rupees at 5.83% applied value-added tax rate is much smaller than the revenue increase in the Export Processing Zone Manufacturing sector from the 1.4 billion rupees increase at an applied rate of 9.37%.

[277] The revenue increase from the 219 million rupees increase at 10.00% applied tariff rate in the SMI sector is larger than the revenue loss from the –18 million rupees decrease in import quantities at 10.00% in the OSR sector.

Thus, welfare contracts with decreases in the preferential price of the European Union and the United States to the world price, reminiscent of the EU and U.S. cases in isolation. The real foreign exchange rate differs across tax replacement scenarios, being a small positive number in the value-added tax case, and minute and negative in the lump-sum tax case, again reflecting similar movements as the EU and U.S. simulation sets. And, the value-added tax rate as well as the lump-sum tax decline because of the increases in the value-added and tariff revenues as in the European Union and United States simulation cases.

3.4.5 Economic Effects of the Mauritius Sugar Export Price Reductions by the European Union and the United States on Labor and Capital Prices

The labor and capital price changes are relevant in the simulation of the preferential price removal for Mauritius sugar exports by the European Union and the United States. Table 25 details the effects of the dual removal on the factor prices, with both value-added and lump-sum tax replacements. It is as follows:

Table 25: Economic Effects of the Joint Sugar Price Reductions on Factor Prices (Percentage Change from Updated Benchmark)[278]

Variables	59% and 45% Decrease in Mauritius Sugar Export Price for the European Union and United States Respectively with Value-Added Tax Replacement	59% and 45% Decrease in Mauritius Sugar Export Price for the European Union and United States Respectively with Lump-Sum Tax Replacement
Skilled Labor Wage (SLW)	1.00	0.08
Unskilled Labor Wage (ULW)	0.33	-0.70
Rental Rate of Capital (ROC)	0.96	0.03
SLW/ULW*	0.67	0.79
ROC/ULW**	0.63	0.74

***** SLW/ULW is defined as the percentage change in the relative factor prices or rather the percentage change in the skilled labor wage less the percentage change in the unskilled labor wage.
**ROC/ULW is defined as the percentage change in the relative factor prices or rather the percentage change in the rental rate of capital less the percentage change in the unskilled labor wage.

Table 25 displays many interesting findings. With skilled labor, the wage increases by 1.00% and 0.08% for the value-added and the lump-sum tax replacement. The dominant increases of output quantity, percentage and absolute quantity change, belongs to the Export Processing Zone Manufacturing sector, regardless of tax replacement, as in the EU and U.S. preferential price cases. The EPZ sector increases its output by 6.53% for the value-added tax replacement (see Section 3.4.1.). It experiences an increase of 168 million rupees for the labor demand in absolute terms. This is far above any other sectoral increase in skilled labor demand, with 3 million rupees being the next closest number in the value-added tax case in the Other Manufacturing sector.[279] As previously shown, the significance of this increase is that the Export Processing Zone Manufacturing sector is the second largest consumer of labor in the Mauritian economy. Although the majority of its labor force is unskilled (76.76%), the sheer

[278] Due to the normalization by the price of consumption, the levels are not comparable across runs. However, the sign of the price changes matters as well as the relative wage changes themselves, where the latter is comparable across simulation runs.
[279] The absolute changes reported above are from the Author's calculations from the simulation results.

magnitude of its output change puts upward pressure on the skilled labor wage anyway. Thus, skilled labor's wage percentage increase is largely driven by the output quantity of the Export Processing Zone Manufacturing sector increasing in the value-added tax case.[280]

The other sectors that experience increased skilled labor demand are the Other Agriculture, Other Manufacturing, and the Electricity, Gas, and Water sectors. The Other Agriculture sector has only a 1 million increase in its skilled labor demand. The sector, as previously stated, has some positive skilled labor demand for production, and hence, its output volume increase would put some pressure on the skilled labor wage to rise. The Other Manufacturing sector, which experiences a 3 million rupees increase in skilled labor demand, also puts upward pressure on the skilled labor wage. However, this sector is neither labor-intensive nor skilled labor abundant, but it does have positive demand for skilled labor because its labor force is 24.24% skilled. Lastly, the Electricity, Gas, and Water sector is capital-intensive, but has a labor force that is primarily unskilled. Thus, its output volume increase causes the skilled labor wage to increase as well. The absolute skilled labor demand increase is 2 million rupees.[281] All the previous arguments apply. Thus, the skilled labor wage increases in value-added tax case largely because of the output volume change in the EPZ sector, but is also positively enforced by the Other Agriculture, Other Manufacturing, and the Electricity, Gas, and Water sector marginally so.

In the lump-sum tax case, the skilled labor wage increases. This can be attributed to the Export Processing Zone Manufacturing and the Other Manufacturing sectors' total output volume expanding by a smaller amount (6.23% and 0.11% respectively-please reference Section

[280] See the IO Table in Chapter 2 for the ranking of the largest to the smallest consumers of labor in the economy. For the share values of skilled and unskilled labor, please reference Table 10 in Chapter 2.
[281] The skilled labor demand increases are the Author's calculations from the simulation results.

3.4.1.).[282] The increases in skilled labor demand are 1 million rupees for the OAG, OMA, and CON sectors respectively and 161 million rupees in the EPZ sector.[283] Thus, the output movements in the Other Agriculture, Export Processing Zone Manufacturing, and the Other Manufacturing sectors, and increased labor demand in the Construction sector increases the skilled labor wage.

Moreover, the unskilled labor reflects an increase in wage in the value-added tax case, but a decrease in the lump-sum tax case, with movements of 0.33% and –0.70% respectively. As previously stated, output quantities increase for the Other Agriculture, Export Processing Zone Manufacturing, and the Other Manufacturing sectors in the value-added and lump-sum tax replacement scenarios while the Electricity, Gas, and Water sector's output volume increases in the value-added tax replacement case only. However, the Other Agriculture sector experiences a 13 million rupees unskilled labor force increase from its increase in output volume. But, as previously mentioned, the Other Agriculture sector is not labor intensive, but its labor force is 90.66% unskilled which is well above the 57.41% economy average for the share of unskilled labor in the labor force. Thus, its output increase would positively affect the unskilled labor wage through its labor force demand.

Furthermore, as previously mentioned, the EPZ sector has the largest output expansion in the value-added tax case. And, the largest unskilled labor demand increase occurs in this sector, increasing by 551 million rupees in the value-added tax case.[284] And, as previously shown, the Export Processing Zone Manufacturing sector also has the second largest demand for labor in the

[282] In the lump-sum tax case, the EPZ and the OAG sectors increase their skilled labor usage by 3.13% and 0.57%. The percentage changes in the sectoral employment are computed in the simulation results even though they are not reported here.
[283] The absolute differences in sectoral employment are the Author's calculations from the simulation results.
[284] The absolute change reported above is the Author's calculations from the simulation results.

economy, with 76.76% of its labor force being comprised of unskilled laborers. Moreover, the Other Manufacturing sector, although it is capital-intensive, it has a labor force that is 76.76% unskilled. Thus, the increases in its output volume would yield upward pressure on the unskilled labor wage. And, from its output quantity increase of 0.41% (see Section 3.4.1.) it incurs a 16 million rupees increase in unskilled labor demand. Lastly, the Electricity, Gas, and Water sector unskilled labor demand increases by 9 million rupees.[285] This can be attributed to the 39.53% of unskilled labor that comprises its labor force. Here again, in the value-added tax case, the EPZ sector dominates the absolute unskilled labor demand increase and is largely responsible for the factor price increase of unskilled labor, with smaller increases in the Other Agriculture, Other Manufacturing, and Electricity, Gas, and Water sectors.

With the lump-sum tax replacement, the unskilled labor wage falls. The Other Agriculture sector demands 12 million rupees of additional unskilled labor in the lump-sum tax case. The EPZ sector dominates the absolute labor demand increase for unskilled labor with a 532 million rupees increase in the lump-sum tax case. Likewise, the OMA sector has increased unskilled labor demand of 11 million rupees. Each sector has a labor force that is predominately unskilled labor, with at least 76.76% of its labor force being unskilled, but at most 90.66% of its labor being unskilled. The Construction sector increases its unskilled labor demand by 10 million rupees and the Wholesale and Retail Trade and Repairs sector increases its demand by 3 million rupees. However, the Sugarcane sector decreases its unskilled labor demand by -451 million rupees, the Sugar Milling sector by -85 million rupees, the Restaurants and Hotels sector by -3 million rupees, the Transport, Storage, and Communication sector by -20 million rupees,

[285] The absolute unskilled labor demand changes are the Author's calculations from the simulation results.

and the Other Services sector by -10 million rupees.[286] The downward pressure exerted on the wage by these decrease in demand is greater than the upward pressure applied on the wage through increasing demand, thus the unskilled labor wage falls.

The rental rate of capital increases regardless of the tax replacement used. In the value-added tax case, the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sector's output volume increase, as previously stated. Each of these sectors is capital-intensive, and therefore demands more of the input that is used intensively in those sectors, capital.[287] The OAG sector demands 22 million rupees of capital, the EPZ sector with a 707 million rupees increase in capital employment, the OMA sector at 9 million rupees, and a 2 million rupees increase in capital demand for the EGW sector.[288] Hence, the increases in the rental rate of capital occur by the increases in the output volumes of the Other Agriculture, Export Processing Zone, Other Manufacturing, and the Electricity, Gas, and Water sectors.

The rental rate of capital, in the lump-sum tax case, increases by 0.03%. The OAG sector's demand increases by 19 million rupees and the EPZ sector's capital demand increases 667 million rupees. Thus, the real rental rate of capital increases in both tax replacement scenarios because of output increases in the OAG and the EPZ sectors only.

The relative wage comparison reflects that the unskilled laborer to be worse off than either the skilled laborer or the capitalist. It incurs a smaller percentage increase than the skilled labor wage and the rental rate of capital, with the percentage change of the ratios in factor prices

[286] All absolute sectoral employment changes are the Author's calculations from the simulation results.
[287] See the Cost Summary Table, Table 5, in Chapter 2 to see the capital and labor costs as a percentage of total domestic supply.
[288] The absolute capital demand increases are the Author's calculations from the simulation results.

being 0.67% and 0.63% respectively in the value-added tax case. In the lump-sum tax replacement scenario, the unskilled labor percentage change is actually negative, while the skilled labor wage and the rental rate of capital rise by a small amount. The corresponding percentage change of the ratio of skilled labor wage to unskilled labor wage percentage changes and the percentage change of the ratio of rental rate of capital to the unskilled labor wage percentage changes are 0.79% and 0.74% respectively. The ratios are smaller in the value-added tax replacement scenario and are slightly larger in the lump-sum tax case, suggesting that the unskilled laborer is marginally worse off in the lump-sum tax case than in the value-added tax case. Thus, the unskilled laborer is the worse off from the joint preferential price removal than either skilled laborers or capitalist, with it marginally faring worse in the lump-sum tax case.

In essence, the skilled labor wage increases for the value-added tax and lump-sum tax replacement. This is largely driven by the output quantity changes in the EPZ sector in the value-added tax case, but is supported by increases in output in the OAG, OMA, and the EGW sectors. However, the increased output volumes in the Other Agriculture, Export Processing Zone Manufacturing, and the Other Manufacturing sectors, along with an increase in skilled labor demand that occur in the Construction sector, causes the skilled labor wage to increase in the lump-sum tax case. Moreover, the unskilled labor wage changes are dependent on the tax replacement chosen, experiencing a positive change with the value-added tax replacement and a negative change with the lump-sum tax replacement. In the value-added tax case, the unskilled labor wage increases because of the EPZ sector's increased labor demand based on its output expansion, with increases in the Other Agriculture, Other Manufacturing, and the Electricity, Gas, and Water sectors marginally. However, in the lump-sum tax case, the output increases in the Export Processing Zone Manufacturing sector mainly, but also in the Other Agriculture and

the Other Manufacturing sectors, but output decreases in the Sugarcane, Sugar Milling, Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors, causing the unskilled labor wage to fall in the lump-sum tax case. Lastly, the rental rate of capital, as the skilled labor wage, increases across both tax replacements as well. The capital price rises because of the output volume increase in the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sectors because they are capital-intensive, but in the lump-sum tax case the increase in the rental rate of capital is due to output increases in both the OAG and the EPZ sectors. In the relative wage comparisons, the unskilled laborers are the most adversely affected than any other factor input.

3.5 CONCLUSIONS

With the adoption of the preferential price removal for the Sugar Milling sector's exports by the European Union, the United States, and both the European Union and the United States, profound impacts on output, exports, imports, welfare, the foreign exchange, the value-added tax rate, the lump-sum tax, the skilled labor wage, the unskilled labor wage, and the rental rate of capital occur. On the one hand, the output quantity changes are largely driven by the absolute increases in the Export Processing Zone Manufacturing sector and the absolute decreases in the Sugarcane and the Sugar Milling sectors for the European Union price cut case and the European Union and the United States price cut case, whereas in the U.S. case, the output quantity change is affected with marginal decreases in the Wholesale and Retail Trade and Repairs and the Transport, Storage, and Communication sectors more so than the contractions in the Sugarcane and Sugar Milling sectors.

Furthermore, the export quantity changes reflect a common thread across the different price scenario cases, regardless of the tax replacement employed. The Export Processing Zone Manufacturing sector is the sector that incurs the largest absolute increases in its export quantity and the Sugar Milling sector suffers the largest absolute declines across all price scenarios. In the case of the import quantity changes, the absolute increases are most pronounced in the Sugar Milling, Export Processing Zone Manufacturing, and the Other Manufacturing sectors (where only the latter two are significant in the U.S. price cut case) and the largest absolute decline occurring in the Transport, Storage, and Communication sector.

Moreover, the welfare effects range from [-0.23%, 0.05%] in the value-added tax replacement scenario and [-0.32%, -0.01%] in the lump-sum tax replacement case, with the largest declines occurring European Union scenario in the value-added tax case and in the full export price liberalization scenario in the lump-sum tax case. Each price cut scenario produces reductions in the value-added tax rate and in the lump-sum taxation, where the latter is in billions of rupees, with -20.28%, -19.34%, and -20.34% downward scaling of the value-added tax for the European Union price cut, United States price cut, and the European Union-United States price cut respectively and -0.71, -0.68, and -0.72 billion rupees for the preferential price scenarios in the same order of occurrence.

Lastly, in factor prices, the skilled labor wage always increases, the unskilled labor wage increases in the value-added tax replacement scenario, but decreases in the lump-sum tax case, and the rental rate of capital increases for all tax cases. These factor price movements are driven by increases in output quantity in the Export Processing Zone Manufacturing sector primarily, but is supported by the output increases in the Other Agriculture sector, the Other Manufacturing sector, the Electricity, Gas, and Water sector (for the value-added tax case only), and the Other

Services sector (in the U.S. case with value-added tax replacement only) or decreases in output quantity which did translate into decreases in the unskilled labor wage, in the Sugarcane sector mainly, but also in the Sugar Milling, Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors. The unskilled laborer always fares worse than the skilled laborer or capitalist when comparing the percentage changes in the ratio of factor prices, with its wage only increasing by more than the skilled labor wage or the rental rate of capital in the U.S. case with value-added taxation.

Returning to the welfare effects, in the counterfactual economy where the 1997 benchmark data is inclusive of the tariff rate changes that are implemented from 1997-2000 and the introduction of the value-added tax, ceteris paribus, in all but one case, the U.S. price liberalization with value-added tax replacement, the welfare effects are negative. Thus, as evidenced through the aggregate effects of the sugar price changes singularly and jointly, it appears undesirable for the Sugar Milling sector to lose either of its preferential pricing agreements. However, we could cautiously approach the most welfare-improving scenario and say it is "better." But, this assumes that Mauritius would be to retain the European Union preferential pricing and only allow the United States to dissolve its trade agreement, allowing the government budget to remain constant with value-added tax replacement.

Given that the European Union will inevitably remove the preferential pricing agreement and the United States may do so as well but the welfare effects presented here may be damped by the domestic tax policy changes incorporated into the model and could thus have a larger effect, Mauritius would ultimately want to adopt policies that would counteract the negative welfare effects that it would see from losing its preferential pricing agreements with the European Union and the United States. The theory of the second best suggests that removing one distortion in the

presence of a second distortion will not necessarily increase welfare in a country, and the simulation results bears this out, that the price distortion removals causes a decrease in welfare in all but one case. Beyond the influence of negotiation talks, ultimately Mauritius cannot dictate whether the EU and U.S. will retain their preferential pricing agreements for Mauritius' sugar exports. However, Mauritius may be able to adopt other trade policies that are welfare-improving to dampen the loss of the preferential pricing agreements. Therefore, if the export price changes do occur, Mauritius can possibly adopt other trade policies that may increase its overall welfare.

One particular distortion that the government of Mauritius can control is the tariffs levied on imported goods. The country is considering the following tariff policy options: tariff liberalization with the European Union; tariff liberalization with the Southern African Customs Union; tariff liberalization with both the U.S. and the SACU; and tariff liberalization with all of its trade partners. These options, in concert with the preferential price changes being removed, may actually increase welfare where it falls or further increase the positive effect on welfare. Thus, Chapter 4 will present the most welfare- improving scenarios of combining the various price scenarios (i.e. the EU, U.S., and joint preferential price removal) with the various potential tariff policy changes (i.e. unilateral tariff liberalization with the EU, SACU, U.S. and the SACU, and with all of its trade constituents), presenting policy recommendations that lessen or even reverse the negative welfare effects that incur from the export price distortion removal alone.

4.0 CHAPTER 4

In light of the potential removal of the preferential sugar export price by the European Union, the United States, or both regions jointly, Mauritius can consider several trade policy adoptions that may counteract the welfare losses. Section 1 will detail the equations that are directly impacted from the change in import tariffs. Section 2 displays the economic effects of combining the 59% price reduction in the European Union for sugar exports originating in Mauritius with unilateral tariff liberalization with the European Union, the Southern African Customs Union, the United States and the Southern African Customs Union jointly, and with all of its trade partners. Section 3 will present the simulation results for the 45% Mauritius sugar export price reduction by the United States as it is combined with each potential tariff policy implementation, detailing the economic effects of these changes. Section 4 will show the effects of the 59% Mauritius price reduction for the European Union, 45% Mauritius sugar export price reduction for the United States, and the various trade policy adoptions combined. Lastly, a brief overview of findings and the conclusion will be discussed in Section 5. Hence, Chapter 4 will exhibit the most and least desirable trade policy choices when the export price change(s) is(are) already implemented, presenting the most and/or the least welfare-improving scenarios.

4.1 AFFECTED EQUATIONS

There are several equations that are directly affected by a change in tariffs. As previously stated in Section 3.1., the producer price of exports, the current-account imbalance, and the zero profit condition equations change as the sugar export price changes. However, the following equations are impacted by the changes in the tariff rate: the government budget constraint, supply value balance, the domestic price for intermediate imports, the domestic price for government consumption, the domestic price of imports for private consumption, and the domestic price of imports for gross domestic capital formation. Hence, the tariff rate changes alone will have an impact on several equations as well.

One equation in which these changes will be evident as the tariff rate changes is the government budget constraint. As previously presented in Section 2.1.2., equation (13) is the government budget constraint and it is as follows:

$$(13) \quad \sum_i \tilde{p}_i^{\,G} G_i = D + \sum_i \tau_{Vi} \left(\tilde{p}_i^{\,C} C_i + \tilde{p}_i^{\,IF} I_i^F \right) + \sum_i \sum_r (1+\tau_{Vi}) t_{ri} p_{ri}^m \left(M_{riC} + M_{riI}^F \right)$$

for all i = 1, 2, …, 11 and r = 1, 2, …, 4.

With a tariff rate change, the right hand side of the equation has to fall for a decrease in the tariff rate t_{ri} for any region r, where r is the United States (1), European Union (2), Southern African Customs Union (3), or the Rest of the World (4). Consumption and investment may increase because foreign goods are cheaper. And, imports for consumption and investment demand will change based on the output and import volume changes. Thus, in order to keep the government

budget deficit constant, with a decrease in tariff, the government budget deficit D may have to increase or decrease. The consumption bundle of the government may become more expensive, and hence a transfer from the consumer through higher taxation must occur to maintain its overall consumption level or if a less expensive consumption bundle occurs, the tax savings are transferred to the consumer. Therefore, the government budget constraint may contract or expand from changes in the tariff rates because of consumption, investment, and imported consumption and investment demand changes.

Also, the domestic supply value balance is directly dependent on the tariff rate because it includes imports for private consumption, fixed capital formation, and public consumption. It is defined as:

$$(18)\qquad \tilde{p}_i S_i = \tilde{p}_i^{Z} \sum_j a_{ij} Y_j + (1+\tau_{Vi})\left(\tilde{p}_i^{C} D_{iC} + \tilde{p}_{iI}^{F} D_I^F \right) + \tilde{p}_i^{G} D_{iG} + \tilde{p}_{iI}^{F} I_i^F$$
$$+ \sum_r (1+\tau_{Vi})(1+t_{ri}) p_{ri}^m \left(M_{riC} + M_{riI}^F \right) + \sum_r (1+t_{ri}) p_{ri}^m M_{riG} \quad \forall \text{ i, j and r.}$$

Along with the value-added tax rate, the tariff rate comprises the imports values of private consumption and investment as well. However, the tariff rate is also applied to the import value for government consumption. The decrease in tariffs will have an ambiguous effect on the total domestic supply given that a decrease in t_{ri} can cause an increase in total import quantities for private consumption, investment, and public consumption, and thus total supply can be augmented or contract based on the overall movements. Therefore, the total supply value may increase or decrease based on a decrease in the tariff rate.

Furthermore, the domestic price for intermediate imports and government consumption are adjusted as the tariff rate decreases. The equations are as in Section 2.2.1 and are as follows:

$$(21)\qquad p_{ri}^N = (1+t_{ri}) p_{ri}^m \text{ for all r = 1, …, 4 and i = 1, …, 11}$$

and

(21a) $p_{ri}^{G} = (1 + t_{ri}) p_{ri}^{m}$ for all r = 1, …, 4 and i = 1, …, 11.

Here, the decrease in the tariff rate will cause the domestic price for intermediate imports, p_{ri}^{N}, to decrease, making the intermediate imports cheaper. Likewise, the domestic price for imports for government consumption will fall because of the decrease in the tariff rate, reducing the price of imports for government consumption. Hence, the imported intermediate and government consumption will fall from decreasing tariff rates.

Lastly, the domestic price of imports for consumption and the domestic price of imports for gross fixed capital formation are affected by a change in tariff rates. The only difference between this set of equations and the previous set of equations is that for consumption and investment, the value-added tax rate is applied to them as well. Equations (22) and (22a) are defined as

(22) $p_{ri}^{C} = (1 + \tau_{Vi})(1 + t_{ri}) p_{ri}^{m}$ $\forall$ r = 1, …, 4 and i = 1, …, 11

and

(22a) $p_{riI}^{F} = (1 + \tau_{Vi})(1 + t_{ri}) p_{ri}^{m}$ $\forall$ r and i.

Based on equation (22) and (22a), it is evident that a decrease in the tariff rate alone will cause the domestic prices of imports of consumption and gross capital formation to fall as well. But, the value-added tax rates, when allowed to vary, may rise by more than the tariff rate falls, causing both domestic prices to rise in the value-added tax replacement case. Therefore, a decrease in the tariff rates will depress the domestic prices for imports for consumption and the domestic price of imports for investment if and only if the value-added tax rate does not rise by more than the tariff rate falls with the value-added tax replacement case. When it is lump-sum tax replacement of tariff revenues, the domestic prices of imports for consumption and

investment will fall. Therefore, the domestic price of imports for consumption and investment may increase or decrease with value-added tax replacement, but will always decrease with lump-sum taxation.

In conclusion, the government budget constraint may fall or increase, only to be adjusted by a transfer from or to the consumer to maintain the government consumption, with a decrease in the tariff rates. However, the supply value balance will move in an ambiguous manner given that the tariff rates falling can cause the import quantities to increase, thereby producing an overall positive or negative effect on the total supply value. Furthermore, the domestic price of imports for intermediate imports and the domestic price of imports for government consumption will fall with the decrease in tariffs, but the domestic prices of imports for private consumption and investment will move in an ambiguous manner, contingent on the tariff rate decrease and value-added tax increase for the value-added tax replacement scenario, and will decrease if the lump-sum tax is the replacement for lost tariff revenues.

4.2 59% MAURITIUS SUGAR EXPORT PRICE REDUCTION BY THE EUROPEAN UNION WITH TARIFF LIBERALIZATION

There are several economic effects that result from the change in the sugar export price by the European Union falling to one and tariff liberalization with the European Union (EU TL); the Southern African Customs Union (SACU TL); the United States and the SACU (U.S.-SACU TL); and with all of its trade partners (FUTL). The EU price cut and tariff reforms will cause the output quantities, export quantities, import quantities, welfare, foreign exchange rate, value-

added tax rate, lump-sum tax, and the factor prices to change.[289] Therefore, this section will capture these changes.

4.2.1 Economic Effects of the Mauritius Sugar Export Price Reduction by the European Union and Tariff Liberalization on Output Volumes by Sector

The output quantities will be affected by the removal of the preferential price of sugar by the European Union and the adoption of unilateral tariff liberalization with the EU, SACU, U.S. and SACU jointly, and with all of its trade constituents. Table 26 will characterize the changes in output volumes based on the sugar price cut with various tariff policies for the value-added and lump-sum tax replacements. It is as follows:

[289] All percentage changes are from the updated benchmark economy, or the updated benchmark, which is inclusive of the tariff changes that occur from 1997-2000 and the introduction of the value-added tax in 1998, with constant indirect taxes net of subsidies rates.

Table 26: Economic Effects of the European Union Sugar Price Reduction and Tariff Liberalization on Output Quantity by Sector (Percentage Change from Updated Benchmark)

Value-Added Tax Replacement

Sectors	A	B	C	D
Sugarcane	-64.29	-66.65	-66.75	-70.00
Other Agriculture	-6.22	-3.08	-3.65	-21.51
Sugar Milling	-61.05	-63.61	-63.72	-67.30
Export Processing Zone Manufacturing	13.19	8.48	8.92	22.97
Other Manufacturing	-5.40	-0.67	-1.24	-11.83
Electricity, Gas, and Water	-2.50	-0.63	-0.86	-6.26
Construction	-0.11	-0.04	-0.04	-0.21
Wholesale and Retail Trade and Repairs	-1.29	-1.15	-1.14	-1.47
Restaurants and Hotels	-7.91	-5.70	-6.43	-26.51
Transport, Storage, and Communication	-2.52	-2.84	-2.88	-5.17
Other Services	-4.73	-1.48	-1.62	-8.91

A: EU sugar price cut and TL with EU, with value-added tax replacement
B: EU sugar price cut and TL with SACU, with value-added tax replacement
C: EU sugar price cut and TL with U.S.-SACU, with value-added tax replacement
D: EU sugar price cut and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors	A	B	C	D
Sugarcane	-64.12	-66.65	-66.73	-69.53
Other Agriculture	-6.00	-3.07	-3.61	-20.96
Sugar Milling	-60.86	-63.61	-63.70	-66.80
Export Processing Zone Manufacturing	13.69	8.49	9.00	24.61
Other Manufacturing	-4.90	-0.65	-1.16	-10.31
Electricity, Gas, and Water	-1.27	-0.60	-0.66	-2.36
Construction	-0.11	-0.04	-0.04	-0.21
Wholesale and Retail Trade and Repairs	-2.47	-1.18	-1.33	-5.30
Restaurants and Hotels	-8.66	-5.72	-6.55	-28.59
Transport, Storage, and Communication	-3.42	-2.86	-3.02	-8.03
Other Services	-4.62	-1.48	-1.61	-8.56

A: EU sugar price cut and TL with EU, with lump-sum tax replacement
B: EU sugar price cut and TL with SACU, with lump-sum tax replacement
C: EU sugar price cut and TL with U.S.-SACU, with lump-sum tax replacement
D: EU sugar price cut and full unilateral tariff liberalization, with lump-sum tax replacement

There are numerous output changes that are noteworthy in this table. Across the value-added and lump-sum tax replacement scenarios, the Export Processing Zone Manufacturing sector is the only sector that experiences a percentage increase in its output volume. Both the percentage increases as well as the absolute changes for the sector are large, reflecting increases that are no less than 8.48% which translates into a 5.6 billion rupees absolute change and up to 24.61% or 16.2 billion rupees large.[290] The Export Processing Zone Manufacturing sector's output volume increases even more with tariff liberalization because of its heavy usage of imported inputs as well. This is not surprising given that the Export Processing Zone Manufacturing sector is the second largest absorber of imports in the Mauritian economy consuming 22.8% of total imports in the 1997 benchmark, but is 33.53% of the total import value in the updated benchmark, and its imported inputs it demands are cheaper, which causes its output to expand by more than in the EU sugar price cut simulation set alone. The EPZ sector, for all positive tariff rates sectors, is one of the least protected sectors in the economy with an average tariff rate of 2.91% (see Table 9). Also, the EPZ sector does not suffer from decreases in output from foreign competition on the domestic market because it exports 87.9% of its total domestic supply, and is 80.95% of the export quantity in the updated benchmark, such that its goods do not really compete with imported goods on the domestic market.[291] Therefore, the Export Processing Zone Manufacturing sector incurs the largest and only percentage and absolute increases in the economy, which are substantial, regardless to the tax replacement chosen and are a larger magnitude than the EU price cut case alone because of the sector's import dependence.

[290] The absolute output quantity changes are the Author's calculations from the simulation results.
[291] Please reference Benchmark Trade Shares of Mauritius 1997 table in Chapter 2 for the import totals by sector.

The largest output volume increases occur in the unilateral tariff liberalization and the European Union tariff liberalization cases. With full tariff liberalization, the output volumes changes are 22.97% or 15.1 billion rupees for the value-added tax replacement or 24.61%, which translate into an absolute increase of 16.2 billion rupees increase in the lump-sum tax case. In the unilateral tariff liberalization, all of its imported inputs become cheaper, allowing for an even larger expansion of output than in any other trade scenario. Also, the European Union tariff liberalization case causes sizable increases in the Export Processing Zone Manufacturing sector's output volume. The percentage increases are 13.19% and 13.69% for the value-added and the lump-sum tax replacement respectively, which are 8.7 billion rupees and 9.0 billion rupees in absolute terms across the tax replacement choices.[292] But, the EU comprises 25.0% of the EPZ sector's total imports, the largest single region of imports for the sector. Thus, tariff liberalization for the European Union will decrease the price of imported goods for a considerable amount of total import quantity for the Export Processing Zone Manufacturing sector. In essence, the output quantities are increased by the greatest amount in the full tariff liberalization case, followed by substantial changes in the European Union tariff liberalization simulation run for the Export Processing Zone Manufacturing sector.

Output volumes decrease for the other ten sectors across every tariff liberalization case, regardless of tax replacement. The most heavily impacted sectors are the Sugarcane and the Sugar Milling sectors. The Sugarcane sector experiences output quantity contractions of output ranging from [-70.00%, -64.12%] for all the simulation scenarios. The absolute changes that occur in the value-added tax case and lump-sum tax case are all about 1.1 billion rupees for the EU TL, SACU TL, and U.S.-SACU TL cases, with the FUTL case producing a an absolute

[292] The absolute output quantity changes are the Author's calculations from the simulation results.

change of 1.2 billion rupees change in both tax cases. However, as before, the Sugarcane sector suffers a considerable decrease in output volume because it only sells its product to the Sugar Milling sector that experiences the second largest contraction in the economy.[293] But, with tariff liberalization the contractions are steeper than in the EU sugar price cut case alone. The further suppression of the output volumes of the Sugarcane sector occurs because the Sugar Milling sector's goods are import-competing and the Sugar Milling sector loses its protection for the only two regions that import sugar, the European Union and the Southern African Customs Union. Since, the Sugar Milling sector has the highest tariff rate levy in the economy of 10.00%, the further contraction of output with tariff liberalization suggests that it is also import-competing. Thus, a loss in tariff protection will depress the production of the Sugar Milling sector, and thus the Sugarcane sector. Hence, the Sugarcane sector's output quantities contract by a significant amount for all tariff liberalization choices, and do so by a larger extent here because the sector's sole customer is import-competing.

The largest output volume decreases occur in the unilateral tariff liberalization case. However, given that the Other Manufacturing sector's output contracts by the greatest extent in the unilateral tariff liberalization case, which purchases 94.41% of the total inter-industry sales of the Sugar Milling sector, the Sugar Milling sector's output contract, and the Sugarcane sector follows suit. Other feedback occurs through the decreases in output quantities in other sectors, so that the SMI sector's output wanes, decreasing its demand for the SUG sector's goods and hence the SUG sector's output falls. As a result, the Sugarcane sector decreases by the largest amount in this case. However, the percentage contractions are all significant and the absolute

[293] Please see the Input-Output Table in Chapter 2 for inter-industry sales.

changes are almost equal, as shown above. Thus, full tariff liberalization causes the largest declines in the Sugarcane sector's output volumes.

The Sugar Milling sector suffers decreases in output volume from -60.86% to -67.30% across all simulation runs. The largest decreases are -948 million rupees to -857 million rupees. Again, part of the decrease is indicative of the sugar export price cut occurring in this sector with its largest consumer of sugar exports, the European Union.[294] But, the declines in overall output are considerably larger than in the EU sugar export price cut case alone of –831 and –833 million rupees for the value-added and lump-sum tax replacement respectively (see Section 3.2.1.). As stated above, since the Sugar Milling sector is highly protected, further output declines may be indicative of the inability of the Sugar Milling sector to compete with imported goods as well, where its output is even further depressed when the European Union and the Southern African Customs Union tariff is removed, the only sectors that import sugar into the Mauritian economy. In order of magnitude, the Southern African Customs Union and the European Union supplies 89.5% and 10.5% of the total Sugar Milling imports. Hence, the Sugar Milling sector experiences large decreases in its overall output volumes because it is import-competing.

The largest decreases in output quantity occur in the unilateral tariff liberalization case. The reasoning is that the Sugar Milling sector is import-competing. In the unilateral tariff liberalization case, both the European Union and the Southern African Customs Union, the only importers of sugar into Mauritius, are included, thereby depressing the import-competing sector's output by the largest amount. Also, a further decline in Sugar Milling's output occurs because of the output decreases by the largest amount in its key inter-industry customer, the

[294] As previously stated, the European Union consumes 95.34% of the total sugar exports for Mauritius in 1997.

Other Manufacturing sector. The more pronounced contractions occur here because the Other Manufacturing sector, which comprises 94.41% of its total inter-industry sales of the Sugar Milling sector, declines its sharpest in this simulation run by -11.83% and -10.31% respectively. This is quite significant considering the Other Manufacturing sector is such an integral consumer of the Sugar Milling sector.[295] Thus, the output quantity decreases in the Sugar Milling sector are most prominent in the unilateral tariff liberalization case because it is import-competing and its key customer's output decreases by the greatest extent here.

Other notable output volume decreases occur in the European Union and the unilateral tariff liberalization cases as well, namely in the Other Manufacturing and the Other Services sector. The Other Manufacturing sector has sizable absolute decreases, although its percentage decreases are not as pronounced as in some other sectors.[296] The unilateral tariff liberalization scenario and the EU TL case produce the largest contraction in the Other Manufacturing sector's output volumes, with a –2.3 billion rupees for the value-added tax case and –2.0 billion rupees in the lump-sum tax case in the unilateral tariff liberalization scenario, and is -1.1 billion rupees and -961 million rupees for the value-added tax and lump-sum tax replacement scenarios respectively for the EU TL scenario. Not only is the feedback pertinent through output volume declines in four of the five largest consumers of the OMA sector's goods and services, the Other Manufacturing sector, the Construction sector, the Transport, Storage, and Communication sector, and the Other Services sector, which make up 68.66% of the OMA sector's inter-industry

[295] Author's calculations of sectoral share of total output value by sector are from the simulation results.
[296] The absolute declines in the SACU TL and the U.S.-SACU TL cases are not comparable to the large increases observed in those tariff liberalization cases. In the SACU TL, the –896 million rupees decrease in the value-added and lump-sum tax replacement is much larger in magnitude that the –131 million rupees and the –128 million rupees decrease in the value-added and lump-sum tax replacement respectively for the OMA sector. The U.S.-SACU absolute differences are just as stark with a –898 and –897 million rupees decline in the value-added and lump-sum tax replacement that are considerably larger than the –244 and –277 million rupees declines in the OMA sector. Thus, neither tariff liberalization case will be discussed here.

sales, contract but the increased contraction seen in the OMA sector is driven by its loss of protection. It has a 7.60% applied tariff rate, which is one of the highest levies in the economy.[297] Thus, the increased foreign competition depresses its output volume, changing from being strictly positive in the EU price cut case alone (see Table 11) to always negative.

The output volume decreases are so stark in the unilateral tariff liberalization case because as an increasing amount of imports are liberalized, the Other Manufacturing sector's output volume falls. The maximum amount of imports is liberalized and because it is import-competing, its output decreases. But, the output volume also falls by a substantial amount when the EU region is liberalized alone because the EU sector is 39.6% of the sectors total imports alone. Therefore, since the OMA sector is import-competing, the removal of the tariffs from with all of its trade partners and with the EU, in that order, will depress its output where it no longer experiences an expansion in output as in the EU price cut case alone.

Likewise, with the Other Services sector, the EU TL and the FUTL cases produce sizable output volume contractions. The contractions are –4.73% to –8.91% in the value-added tax case, but are –4.62% to –8.56% in the lump-sum tax case for each tariff liberalization case respectively. The absolute changes are –1.5 and -2.7 billion rupees for both tariff liberalization cases respectively in the value-added tax replacement and are –1.4 and –2.6 billion rupees across the EU TL and the FUTL cases for the lump-sum tax replacement.[298] The output volume decline is the sharpest in the full unilateral tariff liberalization with all trade constituents. However, the EU tariff liberalization alone yields the only other significant decrease.[299] Each follows from the

[297] For tariff rates, please see Table 9.
[298] The absolute declines are the Author's calculations from the simulation results.
[299] The absolute decreases of –454 and –498 million rupees in the value-added tax case does not compare to the –896 and –898 million rupees decreases that occur in the SACU TL and the U.S.-SACU TL in the value-added tax

amount of imports flowing from the all regions being 100.00% of the total imports being cheaper and in the EU tariff liberalization being 70.6%. But, the Other Services sector suffers its steepest decreases output volume decreases of –8.91% and –8.56% in the value-added and lump-sum tax cases respectively. The increased import quantity occurs because the Other Services sector is highly protected, with an applied rate of 10.00%. This suggests that the sector does not as effectively compete with foreign goods, exhibiting that it too is import-competing. In addition, the Transport, Storage, and Communication sector suffers its sharpest declines of –5.17% and –8.03% across the tax replacement options and comprises 23.65% of the OSR sector's inter-industry sales. [300] With lower demand, there are fewer imports needed. Thus, the overall output contractions of the Other Services sector's occurs because of declines in its major industrial consumers' output and lost tariff protection. Thus, the Sugarcane, Sugar Milling, Other Manufacturing, and the Other Services sectors experience the largest absolute output contractions, with the largest declines are observed in unilateral tariff liberalization scenario.

In conclusion, the Export Processing Zone Manufacturing sector is the only sector whose output volume expands across all scenarios for each tax replacement scenario, with its larger expansions occurring in the unilateral tariff liberalization and the EU TL runs, outstripping the changes in the EU price cut case alone. It is an import dependent sector and thus benefits from tariff liberalization. The Sugarcane and the Sugar Milling sectors suffer deep percentage and absolute decreases in their output volumes for all tariff liberalization cases, but are the most pronounced in the unilateral tariff liberalization and the EU TL cases. Notable decreases in those same trade cases occur for the Other Manufacturing and Other Services sectors, where with tariff

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case. Likewise, the –896 and –897 million rupees declines in the SACU TL and the U.S.-SACU TL are well above the –453 and –493 million rupees decreases considered in the lump-sum tax case.

[300] The sectoral share of the total output quantity in the updated benchmark is the Author's calculations from the simulation results.

liberalization the output volume decreases are larger than the negatives produced by the EU preferential price removal case alone. This is similar to the EU price cut case because the Sugarcane and Sugar Milling sector suffer the largest decreases. But, it is dissimilar in that the Other Manufacturing and the Other Services sectors experience declines in output volumes that even surpass the decreases in the Sugarcane and Sugar Milling sectors.

4.2.2 Economic Effects of the Mauritius Sugar Export Price Reduction by the European Union and Tariff Liberalization on Export Volumes by Sector

Another variable that is affected by the 59% price reduction for Mauritius sugar exports by the European Union and the tariff liberalization jointly is the export quantity. Table 27 supplies the reader with the various export volume changes that occur for the value-added and lump-sum tax replacement scenarios across all simulation runs. Table 27 is as follows:

Table 27: Economic Effects of the European Union Sugar Price Reduction and Tariff Liberalization on Export Quantity by Sector (Percentage Change from Updated Benchmark)

Value-Added Tax Replacement

Sectors*	A	B	C	D
Other Agriculture	-9.59	-3.61	-4.42	-29.00
Sugar Milling	-91.75	-92.11	-92.15	-93.59
Export Processing Zone Manufacturing	13.43	8.57	9.01	23.66
Other Manufacturing	-5.74	0.05	-0.48	-11.51
Electricity, Gas, and Water	-1.21	-0.24	-0.34	-5.34
Wholesale and Retail Trade and Repairs	-4.17	-2.49	-2.72	-11.21
Restaurants and Hotels	-9.24	-6.53	-7.41	-31.17
Transport, Storage, and Communication	-3.41	-3.57	-3.74	-10.41
Other Services	-4.97	-2.30	-2.58	-13.04

A: EU sugar price cut and TL with EU, with value-added tax replacement
B: EU sugar price cut and TL with SACU, with value-added tax replacement
C: EU sugar price cut and TL with U.S.-SACU, with value-added tax replacement
D: EU sugar price cut and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors*	A	B	C	D
Other Agriculture	-9.36	-3.60	-4.38	-28.46
Sugar Milling	-91.71	-92.11	-92.15	-93.50
Export Processing Zone Manufacturing	13.93	8.58	9.09	25.30
Other Manufacturing	-5.21	0.07	-0.39	-9.90
Electricity, Gas, and Water	0.10	-0.23	-0.20	-1.22
Wholesale and Retail Trade and Repairs	-5.23	-2.51	-2.89	-14.41
Restaurants and Hotels	-9.92	-6.55	-7.52	-32.99
Transport, Storage, and Communication	-4.22	-3.59	-3.87	-12.90
Other Services	-4.76	-2.30	-2.54	-12.42

A: EU sugar price cut and TL with EU, with lump-sum tax replacement
B: EU sugar price cut and TL with SACU, with lump-sum tax replacement
C: EU sugar price cut and TL with U.S.-SACU, with lump-sum tax replacement
D: EU sugar price cut and full unilateral tariff liberalization, with lump-sum tax replacement

*Only the sectors with positive export volumes are recorded in this table. Therefore, the Sugarcane and the Construction sectors are not included here. Also, the Electricity, Gas, and Water sector would not have any positive export volume had it not been assigned an amount through the application of the calculated supply shares to the exports of goods and services, a mechanism which is applied to usage values to ensure the share of production of a composite good is assigned to each producer of that good, because it is applied to final demand values as well.

The increases and decreases in export quantity by sector are clearly displayed in this table. The export quantity increases in the Export Processing Zone Manufacturing (all cases), the Other Manufacturing (for the SACU cases only), and the Electricity, Gas, and Water (EU FTA with lump-sum tax replacement) sectors. However, as in the EU price cut case alone, the only notable absolute export volume increases are in the EPZ sector. The absolute changes are 8.0, 5.1, 5.3, and 14.0 billion rupees for the EU TL, SACU TL, U.S.-SACU TL, and the FUTL cases respectively in the value-added tax case and are 8.3, 5.1, 5.4, and 15.0 billion rupees for each tariff liberalization scenario with lump-sum tax replacement. The Other Manufacturing sector's small percentage increases are only 2 million rupees across both tax replacements and the Electricity, Gas, and Water sector's increase is less than 1 million rupees.[301] Thus, they will not be discussed in detail. The Export Processing Zone Manufacturing sector comprises 80.95% of the total export quantity in the updated benchmark.[302] And, as previously stated in the EU price cut alone case, the EPZ sector is largest exporter and one should expect output increases to translate into increases in exports.[303] The Export Processing Zone Manufacturing sector's export quantity increases are more pronounced than in the EU price cut case alone because of its additional output volume increases due to cheaper production costs via cheaper imported inputs. Hence, the EPZ sector incurs substantial export quantity decreases because of its output increases, much larger than in the EU case alone because its imported inputs are less expensive.

The largest export volume increases occur in the European Union and the full unilateral tariff liberalization cases. But, these are the same cases for which the output volumes increase

[301] The absolute export quantity changes are the Author's calculations from the simulation results.
[302] The sectoral share of the total export quantity in the updated benchmark is the Author's calculations from the simulation results.
[303] The EPZ sector's exports do closely tracks that of its output increases (13.19%, 8.48%, 6.73%, 13.58%, 15.04%, 8.92%, 15.39%, and 22.97% for increases in output volumes and 13.43%, 8.57%, 6.79%, 13.83%, 15.31%, 9.01%, 15.68%, and 23.66% for increases in export quantities).

by the greatest extent. In essence, export quantities are driven by changes in output, the largest increases occur in the parallel cases of increased output volumes. And, the increases are larger in the case of the Export Processing Zone Manufacturing sector here than the European Union price cut case simply because larger output adjustments occur with tariff liberalization than without it. The 100% tariff liberalization causes all of its imported inputs to be cheaper, and thus allows for greater output expansion. On the other hand, the European Union tariff liberalization still produces a sizable increase in the Export Processing Zone Manufacturing sector because it accounts for 25.0% of the total imports flowing into the EPZ sector. Since the European Union is the largest single import region of origin for the sector, its output increases by a substantial amount with tariff liberalization with the region. Therefore, the unilateral tariff liberalization and the European Union tariff liberalization cases, in order of magnitude, produce the largest output volume changes for the Export Processing Zone Manufacturing sector.

Furthermore, the export volumes decline for the Other Agriculture, Sugar Milling, Other Manufacturing (non-SACU TL cases), Electricity, Gas, and Water (except in the EU TL with lump-sum tax replacement), Wholesale and Retail Trade and Repairs, Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors. The sectors that suffer the largest percentage decreases in export quantities are the Sugar Milling sector, the Restaurants and Hotels sector, and the Other Agriculture sector.[304] But when assessing the absolute changes, the largest absolute decreases occur in the Sugar Milling sector for all tariff liberalization cases, and are well above other decreases except in the unilateral tariff liberalization case where the

[304] The Restaurants and Hotels and the Other Agriculture sectors are usually in second and third place in terms of the declines in export volumes, sans the U.S. tariff liberalization cases, where the TSC sector moves into third place, displacing the OAG sector.

Other Services sector has sizable export quantity decreases as well. Thus, the Sugar Milling and the Other Services sectors will be discussed.

The Sugar Milling sector has a range of contraction of [-93.59%, -91.06%], thereby exhibiting the largest decreases in export volumes. In absolute terms, the range of percentage decreases result in –662, -664, -665, -675 million rupees decreases in the tariff removal for the EU, SACU, U.S.-SACU, and for all trade partners respectively with value-added tax replacement and –661, -664, -665, -675 million rupees declines in the lump-sum tax case across the same tariff liberalization cases.[305] As previously stated, the Sugar Milling sector exports 95.34% of its total sugar exports to the European Union in 1997 and the sector exports 97.72% of its total production in 1997 as well. Thus, a decrease in the price of exports of 59% by the EU, one would expect a steep contraction in the export quantities. But, the decreases are more pronounced with tariff liberalization than in the European Union sugar price cut case alone because the output of the Sugar Milling sector is further depressed by the loss of protection that results in increased domestic competition from imports. The Sugar Milling sector has the highest tariff rate levy of 10.00%. When this is removed, its output suffers further declines. Thus, the Sugar Milling sector suffers significant decreases in its export volume, in percentage and absolute terms, with the decreases being more pronounced with tariff liberalization than in the EU price cut case alone.

The largest export quantity decreases occur in the unilateral tariff liberalization case. Again, this is logical given that EU and the SACU regions are the only regions that import sugar into Mauritius and the liberalization case which allows for their dual tariff removal is the unilateral tariff liberalization case. Hence the largest influx of additional imports will occur here.

[305] The absolute changes are the Author's calculations from the simulation results.

But, since the SMI sector is import-competing, more imports flowing into the economy will further depress its output volume. And, given that the sector exports such a large portion of its production, but is import-competing, the export quantities contract the most when the flows of imports are highest in the economy (i.e. the cheapest), thereby depressing export quantity. Thus, the SMI sector's exports are most adversely affected in the full tariff liberalization case.

The Other Services sector suffers decreases in its total export quantity as well. However, it only has substantial comparable decreases in the full unilateral tariff liberalization case.[306] For the value-added tax case, the percentage decline is –13.04% and the equivalent absolute change is –545 million rupees. In the lump-sum tax case, the percentage decrease is –12.42% that produces an absolute decline of –519 million rupees. The Other Services sector has it output fall because 99.26% of its inter-industry demand falls because of output volume decreases in other sectors, especially in the Other Services, Transport, Storage, and Communication, and the Restaurants and Hotels sectors because they are 10.57%, 23.65%, and 46.83% of its total inter-industry sales alone. Each of these sectors has their steepest declines occurring in the unilateral tariff liberalization cases. Since the OSR sector is the most heavily protected sector, with an applied tariff rate of 10.00%, whenever the largest amount of import quantity is liberalized, the more depressed its output is. Thus, the export volume will decrease accordingly. As shown in the EU price cut case alone, the OSR sector is adversely affected by output quantity decreases in the SMI sector. And, since the changes are larger negatives here, one would expect the Other Services sector to decline as well. And, it is in the full unilateral tariff liberalization case that the

[306] The Sugar Milling sector's exports decrease for every tariff liberalization case, but the declines in the OSR sector are –207, -97, and –108 million rupees for the EU TL, SACU TL, and the U.S.-SACU TL respectively with value-added tax replacement, but is –199, -97, and –107 million rupees, which are far below the formidable decreases considered that are at least –661 million rupees across those cases. So, only the full unilateral tariff liberalization case will be discussed in detail.

SMI sector decreases are largest. Hence, the FUTL case produces the only comparable declines in the Other Services sector.

Lerner Symmetry is in effect, where the import tariffs essentially operate as an export tax, because the export quantity increases in the economy overall. There appears to be a bias against exports that is lifted with the various tariff liberalizations because the aggregate export volumes increase for all the trade scenarios. In the value-added tax case, the export volume rises by 9.00%, 5.57%, 5.86%, and 15.63% for the European Union, Southern African Customs Union, United States and the Southern African Customs Union, and full unilateral tariff liberalization cases, whereas in the lump-sum tax case, the export volume increases by 9.38% for the EU TL case, 5.58% for the SACU TL case, 5.93% for the U.S.-SACU TL case, and 16.91% in the FUTL case. In the full unilateral tariff liberalization case, the largest expansion of export volume occurs, regardless to the tax replacement chosen. All in all, the export volume increases across all tariff liberalization cases displays how import tariffs are biased against exports.

In conclusion, Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sectors experience export volume increases. But, the Export Processing Zone Manufacturing sector increases for all tariff liberalization cases, incurring the largest increases in export quantity in the economy, especially in the full unilateral tariff liberalization and the European Union tariff liberalization cases, regardless to the tax replacement. This is reflective of the EU price cut case alone in that the EPZ sector export quantity percentage and absolute increases are much larger than in other sectors, but exceed the EU price cut alone because of its imported inputs becoming cheaper. The largest percentage decreases occur in the Sugar Milling, Restaurants and Hotels, and the Other Agriculture sectors despite the tax replacement employed, but the absolute changes are only substantial for the Sugar

Milling sector across all tariff liberalization cases and the Other Services sector in the full unilateral tariff liberalization cases. This differs from the preferential price for sugar being removed by the European Union in that the Other Services sector secures the second largest position for export decreases because it is import-competing, where tariff liberalization decreases its output and hence drives its total export quantity down. Lerner symmetry is also supported, where the aggregate export volume increases for all tariff liberalization scenarios.

4.2.3 Economic Effects of the Mauritius Sugar Export Price Reduction by the European Union and Tariff Liberalization on Import Volumes by Sector

The 59% reduction in the price the European Union pays for sugar exports in 1997 along with the EU TL, SACU TL, U.S.-SACU TL, and the FUTL policy choices will have effects on the import quantities for each sector. Table 28 details the changes in the import quantities for the value-added and lump-sum tax replacement scenarios.

Table 28: Economic Effects of the European Union Sugar Price Reduction and Tariff Liberalization on Import Quantity by Sector (Percentage Change from Updated Benchmark)

Value-Added Tax Replacement

Sectors*	A	B	C	D
Other Agriculture	2.72	6.06	5.96	15.20
Sugar Milling	41.34	58.48	58.43	63.18
Export Processing Zone Manufacturing	11.26	7.23	7.58	20.03
Other Manufacturing	4.17	2.02	2.31	7.71
Restaurants and Hotels	-0.37	-0.99	-0.87	2.43
Transport, Storage, and Communication	-1.13	-1.68	-1.53	3.47
Other Services	16.97	0.57	0.69	25.73

A: EU sugar price cut and TL with EU, with value-added tax replacement
B: EU sugar price cut and TL with SACU, with value-added tax replacement
C: EU sugar price cut and TL with U.S.-SACU, with value-added tax replacement
D: EU sugar price cut and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors*	A	B	C	D
Other Agriculture	2.94	6.07	5.99	15.94
Sugar Milling	42.08	58.50	58.57	65.98
Export Processing Zone Manufacturing	11.83	7.25	7.67	21.92
Other Manufacturing	4.69	2.03	2.39	9.45
Restaurants and Hotels	-1.50	-1.02	-1.05	-1.35
Transport, Storage, and Communication	-2.15	-1.71	-1.70	0.00
Other Services	16.95	0.57	0.68	25.72

A: EU sugar price cut and TL with EU, with lump-sum tax replacement
B: EU sugar price cut and TL with SACU, with lump-sum tax replacement
C: EU sugar price cut and TL with U.S.-SACU, with lump-sum tax replacement
D: EU sugar price cut and full unilateral tariff liberalization, with lump-sum tax replacement

*Only the sectors with positive import volumes are recorded in this table. Therefore, the Sugarcane, Electricity, Gas, and Water, Construction, and the Wholesale and Retail Trade and Repairs sectors are not included here.

Table 28 expresses the import quantity increases and decreases from the EU price cut coupled with the various tariff liberalization policies. Import quantity increases occur in all sectors. Of these sectors, the Sugar Milling and the Export Processing Zone Manufacturing sectors reflect the largest percentage increases. However, when the absolute changes are compared across sectors, the Export Processing Zone Manufacturing and the Other Manufacturing sectors exhibit the largest absolute changes across all the tariff liberalization scenarios.[307] The Export Processing Zone Manufacturing sector experiences a 3.0, 2.0, 2.0, and a 5.4 billion rupees absolute import quantity increase in the EU TL, SACU TL, U.S.-SACU TL, and the FUTL respectively with value-added tax replacement and a 3.2, 2.0, 2.1, and a 5.9 billion rupees absolute import quantity increase across the four trade liberalization cases in the lump-sum tax scenario.[308] The import quantity increases to a greater extent with tariff liberalization because the EPZ sector is so reliant on imported inputs for production. As mentioned in Section 3.2.1., the EPZ sector is the second largest absorber of imports in the economy comprising 22.8% of total Mauritian import value in 1997, but is 33.53% of the total import value in the updated benchmark. Moreover, the import quantity share is 34.40% in the updated benchmark and it imports 53.7% of its total domestic supply.[309] However, the EPZ sector has a 2.91% tariff rate in this study (see Table 9), so the removal of protection, albeit a low tariff rate, will boost

[307] The Sugar Milling sector has the most pronounced percentage increases in import quantities. It increases range from [37.73%, 65.98%]. And, as previously shown in Section 3.2.3., the base for import quantities for the European Union and the Southern African Customs Union are quite small, the only two regions that import sugar to the Sugar Milling sector. Only 0.69% of the 78.5 billion rupees in the updated benchmark flow into the Sugar Milling sector. Thus, the increases are as large as they are. Also, the Sugar Milling sector still has some domestic supply to meet and thus the total imports must rise to make up for the windfall decrease occurring in its output. But, the decrease in the average applied tariff rate of 10.00% (see Table 9) to zero for the only two regions that import sugar to that sector would cause a greater flow of imports as well.

[308] The absolute import quantities are the Author's calculations from the simulation results.

[309] The share totals are the Author's calculations from the updated benchmark's simulation results. The percentage of its total domestic supply is imported is reported in Table 4.

import quantities somewhat.[310] Thus, with its demand for imported inputs in production, the cheaper import costs decreases its total production costs, thereby raising its overall output.

The import quantity increases follow the same ordinal pattern as the output quantity increases, with the full unilateral tariff liberalization cases producing the largest increases, followed by the European Union tariff liberalization case. The largest change is when all regions have zero tariffs because it boosts output to the greatest extent because imported inputs, on which the Export Processing Zone Manufacturing sector is heavily reliant, are the cheapest here given the EPZ sector has positive import flows from all regions in this study. However, as previously stated, given its key region of import origin is the EU at 25.0%, tariff liberalization for this region will cause the sector's production costs to fall and overall output quantity to rise for the Export Processing Zone Manufacturing sector. Thus, the EU TL case produces the second largest import quantity increase. Therefore, the EPZ sector's import quantity changes are the largest in the full unilateral tariff liberalization case and secondarily so in the EU TL case.

Also, the Other Manufacturing sector increases its total import volume by a substantial amount. The percentage increases are 2.02% to 21.92%. But, these percentage changes are applied to an import quantity base that is the largest in the updated benchmark than any other sector at 46.42%.[311] And, the absolute changes are 1.5 billion rupees for the EU TL, 735 million rupees for the SACU TL, 842 million rupees for the U.S.-SACU TL, and 2.8 billion rupees for the FUTL for the value-added tax replacement and are 1.7 billion rupees, 740 million rupees, 870 million rupees, and 3.4 billion rupees for the various tariff liberalization with the European Union, the Southern African Customs Union, the United States, and the Southern African

[310] The import increases here are not as driven by the loss of protection as much as the increase due to increased output volumes.
[311] The import quantity share total is the Author's calculation from the simulations results.

Customs Union jointly, and with all of its trade constituents.[312] These import increases are considerably larger than those found in the EU price cut case alone and it is because the OMA sector is also one of the most protected sectors in the economy. Thus, the decrease from 7.60% to zero across various regions causes its import quantities to rise as well. All in all, the Other Manufacturing sector has import quantities to rise because it loses its protection via tariff liberalization and has a heavy reliance on imports.

The largest import quantity changes are in the Other Manufacturing sectors are in the EU TL and in the full unilateral tariff liberalization cases. In the OMA sector, the largest to smallest single regional import shares are 39.6%, 14.8%, and 4.0% for the EU, SACU, and the U.S. respectively. With the European Union being the single most important region by itself, large import quantity increases occur when this significant regions is affected, namely the EU TL case. This phenomenon occurs because, as previously stated, the OMA sector is heavily dependent on imported inputs, where the largest percentage of goods affected by tariff liberalization will cause the largest import quantity increases and the results bear this out. Thus, the full unilateral tariff liberalization case causes the largest increases in imports because of the removal of the high tariff barrier. Therefore, import quantity increases are most distinct in the full and in the European Union tariff liberalization cases, in order of magnitude.

Another sector in which the import quantity increases must be duly noted is the Other Services sector. But, it only has considerable increases in its import quantity in the EU and the full unilateral tariff liberalization cases, with 16.97% and 23.73% increases in the value-added tax case respectively and 16.95% and 25.72% in the lump-sum tax case respectively. Here, the absolute changes in the EU and full tariff liberalization cases are 817 million rupees and 1.2

[312] The absolute import volume increases are the Author's calculations from the simulation results.

billion rupees increases in the value-added and lump-sum tax cases respectively.[313] Import quantities expand here rather than contract, as under the EU price cut case alone (see Table 13). But the sector has one of the highest tariff rate levies in the economy, with an applied rate of 10.00%. Thus, when tariffs are liberalized for the regions that have the highest share percentage of total imports, the import quantities increase. The reasoning is simply this, the EU makes up 70.6% of the total imports flowing into the Other Services sector alone, where the ROW sector makes up 26.1%. Therefore, whenever the European Union tariff liberalization is applied, large increases in imports occurs. Also, the FUTL case reflects the largest increases in import volume, regardless of the tax replacement. This is because both the European Union and the Rest of the World tariff liberalizations are combined here. Hence, the import quantity increases for the Other Services sector are most significant in the EU and full tariff liberalization scenarios across the value-added tax and lump-sum tax cases because the sector's key import region, the European Union (70.6% of its total imports), and then all of its trade constituents (100%) no longer face tariff barriers.

On the other hand, the Restaurant and Hotels and the Transport, Storage, and Communication sectors experience negative import quantity changes. The percentage changes range from [-0.37%, -2.43%] in the RAH sector across both tax replacements and from [-2.15%, 3.47%] in the TSC sector across all simulation runs. However, in absolute terms, the Transport, Storage, and Communication sector has a –55, -81, -74, and 167 million rupees absolute change in the value-added tax replacement for tariff liberalization with the EU, SACU, U.S. and SACU jointly, and with all of its trade partners, while the absolute changes are –104, -82, -82, and 0 million rupees for the lump-sum tax replacement across the four trade liberalization cases. These

[313] The absolute import quantity increases are the Author's calculations from the simulation results.

changes are much larger than the –7, -19, -17, and 47 million rupees changes across the various tariff liberalization cases with value-added tax replacement and –29, -20, -20, and –26 million rupees changes in the lump-sum tax case for the EU, SACU, U.S.-SACU, and the full tariff liberalization cases respectively for the Restaurants and Hotels sector.[314] However, I will not discuss the changes any further because they are no more than 0.001 or 0.10% of the total import volume across all tariff liberalization choices.[315] Thus, Restaurants and Hotels and the Transport, Storage, and Communication sectors experience both positive and negative import quantity movements, with the largest absolute movements occurring in the TSC sector, although they all are fairly small movements overall.

It is important to note that the aggregate import volume increase for all tariff liberalization cases and for both tax replacement options. In the value-added tax replacement scenario, the import volume increases by 7.16%, 3.96%, 4.23%, and 13.33% for free trade with the EU, free trade with the SACU, free trade with the U.S. and the SACU, and free trade with all of its trade constituents respectively. Also, in the lump-sum tax case, it rises by 7.52% in the EU TL case, by 3.97% in the SACU TL case, by 4.29% in the U.S.-SACU TL case, and by 14.53% in the FUTL case. Therefore, the import quantities increase, driven by the import increases in import dependent and/or highly protected sectors.

Hence, the import volume increase for the Other Agriculture, Sugar Milling, Export Processing Zone Manufacturing, and Other Manufacturing sectors, with the largest increases occurring in the Sugar Milling sector. The EU price reduction scenario is similar in that the Sugar Milling, Export Processing Zone Manufacturing, Other Agriculture, and the Other

[314] The absolute changes in the import volume are the Author's calculations from the simulation results.
[315] Author's calculations.

Manufacturing sectors, in that order of total volume, increase their imports, but differs in that the EPZ, OMA, and OSR sectors incur the largest absolute changes. And, with the inclusion of tariff liberalization, the Restaurants and Hotels and the Transport, Storage, and Communication sectors are not strictly negative for the value-added and lump-sum tax replacement scenarios, but in absolute terms, the TSC is the most dominant sector of import quantity decreases although its increases are still negligible. Lastly, the aggregate import quantity increases for all trade liberalization scenarios, indicative of the import dependence and/or removal of protection for high tariff sectors.

4.2.4 Economic Effects of the Mauritius Sugar Export Price Reduction by the European Union and Tariff Liberalization on Welfare, Foreign Exchange, and the Replacement Taxes

The welfare, real foreign exchange rate, value-added tax rates, and the lump-sum taxation are also variables affected by the 59% Mauritius sugar export price reduction by the European Union coupled with tariff liberalization with either EU, SACU, U.S.-SACU, or all of its trade partners cases. This section will detail the subsequent changes in each of the aforementioned variables with the changes in the sugar price and various tariff liberalizations for both the value-added and the lump-sum tax replacement. Table 29 states:

Table 29: Economic Effects of the European Union Sugar Price Reduction and Tariff Liberalization on Welfare, Foreign Exchange, Value-Added Tax Rate, and Lump-Sum Taxation (Percentage Change from Updated Benchmark Except Lump-Sum Tax)

Value-Added Tax Replacement

Sectors	A	B	C	D
Welfare	-0.69	-0.39	-0.44	-0.79
Foreign Exchange Rate (e)*	-0.98	0.08	-0.10	-4.09
Value-Added Tax Rate	33.67	0.82	5.37	113.62
Lump-Sum Tax (Billions of Rupees)	-	-	-	-

A: EU sugar price cut and TL with EU, with value-added tax replacement
B: EU sugar price cut and TL with SACU, with value-added tax replacement
C: EU sugar price cut and TL with U.S.-SACU, with value-added tax replacement
D: EU sugar price cut and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors	A	B	C	D
Welfare	-0.59	-0.39	-0.43	-0.46
Foreign Exchange Rate (e)*	0.57	0.12	0.15	0.91
Value-Added Tax Rate	-	-	-	-
Lump-Sum Tax (Billions of Rupees)	1.17	0.03	0.19	3.90

A: EU sugar price cut and TL with EU, with lump-sum tax replacement
B: EU sugar price cut and TL with SACU, with lump-sum tax replacement
C: EU sugar price cut and TL with U.S.-SACU, with lump-sum tax replacement
D: EU sugar price cut and full unilateral tariff liberalization, with lump-sum tax replacement

*e is defined as Rupees per Foreign Currency.

There are several interesting characteristics shown in Table 29 based on the joint price reduction and various tariff liberalization cases. First, in the value-added tax case, the welfare falls for all tariff liberalization scenarios, contracting by more than the EU price cut case alone. In the value-added tax case, the additional decreases that occur from tariff liberalization with the EU, SACU, U.S.-SACU, and all of its trade partners are –0.46, -0.16, -0.21, and –0.56 respectively.[316] The smallest contraction occurs in the SACU tariff liberalization case. The largest contraction occurs in the full unilateral tariff liberalization case, with a welfare decline of –0.79%. Recall that welfare decreases from the sugar export price cut alone by the European Union, with the price of exports falling for a primary export sector, the Sugar Milling sector. Thus, the EU price cut with tariff liberalization further decreases the welfare because consumers are more adversely affected by the increase in the value-added tax, which is applied to the domestic output sold domestically as well as on imported goods that fulfill consumption and investment demand so that the consumption bundles for the representative agent are more expensive. The welfare declines by at least –0.39% because sizable increases in the value-added tax rate occur. However, the reduction of tariffs can also exacerbate the contractions in welfare because the efficiency gains of distortionary import tariff taxation are greater than that of the distortionary value-added tax.

Likewise, welfare falls for the lump-sum tax replacement scenario, regardless of the tariff liberalization that takes place. The EU TL case's welfare decline is –0.59%, the SACU TL case produces a decline of –0.39%, the U.S.-SACU TL case welfare decline is –0.43%, and the FUTL case produces a welfare decline of –0.46%. The least prominent decrease in welfare is in the SACU case, where welfare is –0.39%. These decreases are quantitatively a larger negative than

[316] The difference reported above is between the –0.23% decrease in the EU price cut case alone (see Table 14) and the percentage amounts reported here, i.e. –0.69 less –0.23 to get the differences reported above.

the EU price cut case alone. Therefore, the smallest amount of import quantity is affected by the removal of tariffs on goods and services from the SACU. Again, the consumer has to only transfer a small amount to the government, but welfare still falls.

However, the most prominent decrease in welfare occurs in the EU TL scenario with -0.59%, or an additional –0.30 decline in welfare. But, there is an average of 30.1% of total imports from 1969-2003 that flowed into Mauritius from the European Union alone. Please note that these are larger decreases than in the European Union removal of the preferential pricing for Mauritius' sugar exports. However, the further depression of welfare could be the direct result of the substitutability between domestically produced and imported goods. In other words, the influx of additional imports further depresses the output of certain sectors (import-competing sectors) such as the Other Agriculture, Sugar Milling, Other Manufacturing, and the Other Services sectors. Also, the lump-sum tax is transferred from the consumer to the government to maintain the government deficit in the amount of 1.1, 0.03, 0.19, and 3.90 billion rupees. Thus, each substantial increase in the billions of rupees transferred to the government by the consumer will depress overall household consumption, and by definition, decrease welfare. The lump-sum tax replacement, being a non-distortionary tax, the welfare is not as adversely affected, proving the theory of the second best again, that removal of a distortion with other distortions in place is not necessarily welfare-improving. Hence, welfare declines regardless to tax replacement for all tariff liberalization policy implementations, always exceeding the declines in welfare from the European Union price cut scenario alone.

Welfare may not have increased with tariff liberalization because the simulations do not capture the increased access to key import regions. The European Union, which is Mauritius' key import region of origin, absorbs 65.9% of its total exports from 1969-2003, on average. The

United States, even though it is a relatively small importer to the Mauritian economy, it is the second largest export region of destination for Mauritius, with an average of 11.8% of the total exports flowing to the United States from 1969-2003.[317] Therefore, the true welfare gains may not be fully realized without the explicit modeling reciprocal access. Harrison, Rutherford, and Tarr (2002) show a similar effect with Chile and how without improved access, it has negative effects on its welfare.[318] Hence, welfare declines may not be fully realized because the increased reciprocal access is not modeled here.

The real foreign exchange rate varies across tariff liberalization cases, for both the value-added and lump-sum tax replacement. For the value-added tax, the foreign exchange rate falls for the EU, U.S.-SACU, and the full unilateral tariff liberalization cases by –0.98%, -0.10%, and –4.09%. But, the foreign exchange rate falling is consistent since it signifies an appreciation of the rupee. There is a decrease in the import price of foreign goods, which implies that foreign goods become cheaper relative to domestic goods, and hence the rupee is more expensive in foreign currency terms. And, the larger percentage a region or set of regions comprises of total import quantity, the larger the appreciation becomes where the SACU alone comprises 10.4% of total imports, U.S. and SACU combined comprise 14.0% of total imports, the European Union 30.1%, on average, from 1969-2003.[319] Thus, the largest appreciation occurs with the full tariff liberalization case. In the SACU TL case the value-added tax revenue moves only marginally and in this case, the foreign exchange rate increases by a marginal amount of 0.08%. A slight depreciation actually occurs given the value-added tax rate did not outweigh the imports that have their tariffs decrease. But, this depreciation is essentially zero. In 1997, only 12.5% of

[317] Author's calculations from the United Nations, International Trade Statistics Yearbook – Various Years.
[318] Harrison, Rutherford, and Tarr, 2002, p. 62-63.
[319] Author's calculations from the United Nations, International Trade Statistics Yearbook – Various Years.

total imports would be affected by the tariff liberalization, with the Southern African Customs Union. Thus, the foreign exchange rate rises and falls with the value-added tax replacement, where its largest appreciation occurs in the unilateral tariff liberalization case and a slight depreciation occurs in the SACU TL case.

In the lump-sum tax replacement scenario, the foreign exchange rate increases for all trade scenarios, which signifies a depreciation of the rupee. The lump-sum tax, without adding any distortion to the economy, allows the cheaper foreign currency effects to flow through the economy, whereas the value-added tax causes the import prices to rise as it rises, moving in the opposite direction of the effects of tariff liberalization. This explains the stark contrast of the foreign exchange under the value-added tax replacement versus the foreign exchange under the lump-sum tax. Without the value-added tax rates adjusting, the domestic prices of imports for consumption and the domestic prices of imports for investment fall. The largest depreciation of the currency occurs with the full unilateral tariff liberalization simulation run. Thus, the real foreign exchange rate rises or falls, dependent on the tariff liberalization and tax replacement chosen.

Furthermore, both the value-added tax rate and the lump-sum tax both increase. In the value-added tax case, the rate increases by as much as 113.62% in the unilateral tariff liberalization and as small as 0.82% in the SACU TL case. It is not surprising that for tariff liberalization scenarios with import regions would cause the value-added tax rate to rise to ensure revenue neutrality. Thus, in the full tariff liberalization simulation run the largest amount of tariff revenues need to be replaced and the value-added tax rates, regardless to the increase in output and import quantities, is still forced to rise to make up for lost tariff revenues and depress the welfare more than any other tariff liberalization case. It is obvious that the tariff revenue

falls because of the adoption of tariff liberalization with key importer, the EU, and all of its trade partners.

In the lump-sum tax replacement, the lump-sum tax increases from 0.03 billion to 3.90 billion rupees. As in the value-added tax case, with the tariff rate falling in key import region, namely the European Union singularly and all of its trade constituents, the increases in lump-sum transfers are most pronounced when liberalization occurs with these regions. Therefore, the full tariff liberalization produces a 3.90 billion rupees lump-sum taxation increase and a 1.17 billion rupees increase occurs for the EU tariff liberalization, while only changing by 0.03 and 0.19 billion rupees in the SACU and the U.S.-SACU tariff liberalization cases. As in the value-added tax case, the largest increases in taxation occur in the cases where regions have substantial import share, increasing as the total import quantity affected by the tariff liberalization increases. Therefore, the value-added tax rate and lump-sum tax rise for all tariff liberalization cases, where in both cases, the largest expansions occur in the unilateral tariff liberalization cases and secondarily so the EU tariff liberalization cases.

Thus, the welfare falls in both the value-added tax and lump-sum tax replacement, further depressed than in the European Union price cut scenario because of the increase in the value-added and lump-sum taxation because of lost tariff revenues. Furthermore, the real foreign exchange rate, given the pressure for the rupee to appreciate because of falling import prices from tariff liberalization, but to depreciate because of the sugar export price, appreciates for three of eight cases and depreciates in five of eight cases. Lastly, the value-added tax rate and lump-sum taxation increases for all trade scenarios, where the largest increases occur in the full unilateral tariff liberalization case, and by a lesser, but still significant extent, in the European Union tariff liberalization scenario.

4.2.5 Economic Effect of the Mauritius Sugar Export Price Reduction by the European Union and Tariff Liberalization on Labor and Capital Prices

The factor prices for the Mauritian economy also adjust with the European Union decreasing the price it pays for Mauritian sugar exports to the world price of one in conjunction with various tariff liberalization scenarios. Therefore, Table 30 will display the percentage changes in the skilled labor wage, unskilled labor wage, and the rental rate of capital along with the percentage change in the ratio of the factor prices. Table 30 is as follows:

Table 30: Economic Effects of the European Union Sugar Price Reduction and Tariff Liberalization on Factor Prices (Percentage Change from Updated Benchmark)[320]

Value-Added Tax Replacement

Sectors	A	B	C	D
Skilled Labor Wage (SLW)	-2.35	0.24	0.06	-5.68
Unskilled Labor Wage (ULW)	1.80	0.51	0.52	3.72
Rental Rate of Capital (ROC)	0.28	0.67	0.58	-0.34
SLW/ULW*	-4.08	-0.27	-0.46	-9.06
ROC/ULW**	-1.49	0.16	0.06	-3.90

A: EU sugar price cut and TL with EU, with value-added tax replacement
B: EU sugar price cut and TL with SACU, with value-added tax replacement
C: EU sugar price cut and TL with U.S.-SACU, with value-added tax replacement
D: EU sugar price cut and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors	A	B	C	D
Skilled Labor Wage (SLW)	-0.90	0.28	0.30	-1.00
Unskilled Labor Wage (ULW)	3.50	0.55	0.79	9.51
Rental Rate of Capital (ROC)	1.78	0.71	0.82	4.64
SLW/ULW*	-4.25	-0.27	-0.49	-9.60
ROC/ULW**	-1.66	0.16	0.03	4.45

A: EU sugar price cut and TL with EU, with lump-sum tax replacement
B: EU sugar price cut and TL with SACU, with lump-sum tax replacement
C: EU sugar price cut and TL with U.S.-SACU, with lump-sum tax replacement
D: EU sugar price cut and full unilateral tariff liberalization, with lump-sum tax replacement

***** SLW/ULW is defined as the percentage change in the relative factor prices or rather the percentage change in the skilled labor wage less the percentage change in the unskilled labor wage.
**ROC/ULW is defined as the percentage change in the relative factor prices or rather the percentage change in the rental rate of capital less the percentage change in the unskilled labor wage.

[320] Due to the normalization by the price of consumption, the levels are not comparable across runs. However, the sign of the price changes matters as well as the relative wage changes themselves, where the latter is comparable across simulation runs.

Table 30 presents several interesting findings. First, the skilled labor wage percentage increases and decreases are both tariff liberalization and tax replacement dependent. In the value-added tax case, the skilled labor wage increases in the SACU tariff liberalization and the U.S.-SACU tariff liberalization by 0.24% and 0.06% and in the lump-sum tax case by 0.28% and 0.30% for the SACU and U.S.-SACU tariff liberalizations respectively. The Export Processing Zone Manufacturing sector's output expands by the largest amount and is the primary contributor to the increases in the skilled labor wage. As previously discussed, it is the second largest absorber of labor in the economy.[321] And, even though it has a workforce that is 76.76% unskilled, it does demand skilled laborers (24.24%). Therefore, because of the EPZ sector's substantial labor force base, where it demands 17.51% of the total skilled labor in the updated economy, increases in its output puts upward pressure on the skilled labor wage.[322] And, for the SACU TL the sector demands 225 million rupees of additional labor and in the U.S.-SACU TL case, it demands 237 million rupees additional skilled labor in the value-added tax case, while demanding 225 and 239 million rupees of additional labor for the SACU TL and the U.S.-SACU TL respectively with lump-sum tax replacement. This is while the OSR sector decreases its skilled labor demand by –95 million and –103 million rupees for the tariff liberalization cases across both the SACU and U.S.-SACU tariff liberalization cases and decreasing its skilled labor demand by –95 and –101 million rupees across both tariff liberalization cases in the lump-sum tax case. Therefore, the increases in the output volume of the EPZ sector cause the skilled labor wage to rise.

On the other hand, the skilled labor wage falls in the European Union and the unilateral tariff liberalization simulation runs, with decreases of -2.35% and –5.68% respectively for the

[321] Please reference the IO Table in Chapter 2 for the absolute values of labor.
[322] Table 10 in Chapter 2 provides the Author's calculations for the skilled and unskilled labor shares by sector.

value-added tax case and by –0.90% and –1.00% in the lump-sum tax replacement. The full unilateral tariff liberalization hurts the skilled labor wage to the greatest extent. However, this makes sense given that the output contracts for every sector, except the Export Processing Zone Manufacturing sector, by the largest amounts over any other tariff liberalization scenario in the unilateral tariff liberalization case and the EPZ sector is only 17.51% of the skilled labor demand in the updated benchmark.[323] The Other Services sector's output contractions are largest in the tariff liberalization case, with a –4.73% and –8.91% decrease in the EU TL and the FUTL cases respectively with value-added tax replacement and –4.62% and –8.56% in the EU TL and FUTL cases respectively with lump-sum tax replacement. The absolute changes are –252 and –464 million rupees in the value-added tax case and –244 and –436 million rupees in the lump-sum tax case.[324] The Other Services sectors, the sector w 70.89% of its labor force is comprised of skilled labor, contract by its largest amount here, thereby depressing the skilled labor wage. But, all other sectors experience negative output changes by as much as –70.00%, which also demand some skilled labor, so the wage of skilled labor falls. So, not only are the sectors with skilled labor as the majority of their labor force falling, but other sectors as well, all of which have some percentage of their labor force being comprised of skilled labor, thereby depressing the skilled labor wage rather than raising it. Thus, the larger decreases in output volume, in the Other Services sector, are enough to decrease the skilled labor wage in the European Union and full unilateral tariff liberalization cases.

The unskilled labor wage always increases across all tariff liberalization choices. In the value-added tax case, it rises by 1.80%, 0.51%, 0.52%, and 3.72% for tariff liberalization with the EU, SACU, U.S.-SACU, and with all of its trade partners, and increases by 3.50%, 0.55%,

[323] The sectoral share of unskilled labor is the Author's calculations from the simulation results.
[324] The absolute unskilled labor demand changes are the Author's calculations from the simulation results.

0.79%, and 9.51% in the lump-sum tax case across all tariff liberalization cases. The absolute increases in the unskilled labor demand for the Export Processing Zone Manufacturing sector are 980 million, 685 million, 715 million, and 1.6 billion rupees with value-added tax replacement and are 1.0 billion, 686 million, 720 million, and 1.7 billion rupees for all tariff liberalization scenarios.[325] In this simulation set, only the EPZ sector's output increases. But, the EPZ sector, although capital-intensive, it has a labor force that is 76.76% unskilled. It is also 40.20% of the total unskilled labor demand in the updated benchmark.[326] Hence, the larger output increases due to it being favored by lower tariffs because it is imported input dependent causes a considerable increase in its unskilled labor demand. Hence, tariff liberalization favors unskilled workers, solely through the EPZ sector's output expansions.

Furthermore, the rental rate of capital increases and decreases across the various tariff liberalization cases. More specifically, the percentage changes range from [-0.34%, 0.67%] in the value-added tax case and [0.71%, 4.64%] in the lump-sum tax case. Every single increase is driven by the increases in the additional sectoral capital deployment through the EPZ sector. In the value-added tax case, the capital employment increases by 1.5 billion, 946 million, 1.0 billion, and 2.8 billion rupees across the four tariff liberalization cases respectively, but by 1.6 billion, 948 million, 1.0 billion, and 3.0 billion rupees in the EU TL, SACU TL, U.S.-SACU TL, and the FUTL scenarios respectively in the lump-sum tax case.[327] But, the Export Processing Zone Manufacturing sector only accounts for 26.74% of the capital demand in the updated benchmark.[328] Because the sector influences a smaller portion of capital demand, the rental rate

[325] The absolute unskilled labor demand increases are the Author's calculations from the simulation results.
[326] The sector's share of total unskilled labor demand in the updated benchmark is the Author's calculations from the simulation results.
[327] The absolute sectoral capital demand is the Author's calculations from the simulation results.
[328] The sectoral share of the capital input demand is the Author's calculations from the simulation results.

of capital decreases. The reasoning is that the capital-intensive sectors with sizable value-added tax rates, namely the Sugar Milling, Other Manufacturing, and the Electricity, Gas, and Water sectors, all of which have the maximum value-added tax rate levy of 10.00% are most adversely affected by the increase in the full tariff liberalization case (see Table 8). Their output contracts by the largest amount in the FUTL with value-added tax replacement and their decreases are enough to cause the rental rate of capital to fall in this tariff liberalization scenario. Thus, the rental rate of capital experiences increases in all but the unilateral tariff liberalization case with value-added tax replacement.

Relative factor price changes exhibit several interesting results. The percentage change in the ratio of skilled labor wage percentage change to the unskilled labor wage percentage change are –4.08%, -0.27%, -0.46%, and –9.06% in the value-added tax case and are –4.25%, -0.27%, -0.49%, and –9.60% for the tariff liberalization with the EU, SACU, U.S. and SACU, and with all of its trade partners respectively. In each instance, the unskilled labor wage percentage change is larger than the skilled labor wage percentage change. The rental rate of capital actually increases by a greater extent in the SACU TL and U.S.-SACU TL where the ratios are –1.49%, 0.16%, 0.06%, and –3.90% for the value-added tax replacement case and –1.66%, 0.16%, 0.03%, and –4.45% in the lump-sum tax case for the EU TL, SACU TL, U.S.-SACU TL, and the FUTL cases respectively. However, the unskilled laborer is better off than the capitalist in the European Union tariff liberalization and the full unilateral tariff liberalization cases. The unskilled labor fares better with tariff liberalization than without it. The adverse effects of the sugar export price reduction on a predominately unskilled labor force, coupled with tariff liberalizations causes the unskilled laborer to be better off than what it is under the EU price cut case alone. Therefore, the unskilled laborer is always better off than the skilled laborer,

but is only better off than the capitalist in the European Union tariff liberalization and the full unilateral tariff liberalization cases across both tax replacement options.

In conclusion, the increases in the output volume of the EPZ sector cause the skilled labor wage to rise in the SACU and the U.S.-SACU cases. But, the larger decreases in the output volumes of the OSR sector are significant enough to cause the skilled labor wage to fall in the European Union and the full unilateral tariff liberalization case. Overall, tariff liberalization favors unskilled workers, solely through the EPZ sector's output expansions. The rental rate of capital increases in all but the unilateral tariff liberalization case in the value-added tax case, again from the EPZ sector's output increases, but falls due to large output volume decreases in the Sugar Milling, Other Manufacturing, and the Electricity, Gas, and Water sectors. And, when assessing the ratios of the percentage changes in the factor prices the unskilled laborer always does better than the skilled laborer, but only does better than the capitalist in the European Union tariff liberalization and in the full unilateral tariff liberalization cases.

4.3 45% MAURITIUS SUGAR EXPORT PRICE REDUCTION BY THE UNITED STATES WITH TARIFF LIBERALIZATION

The United States' removal of its preferential price for Mauritius' sugar export price and the establishment of unilateral tariff liberalization with either the European Union; the Southern African Customs Union; the United States and the Southern African Customs Union; or with each of its trade partners will also affect the output volumes, export volumes, import volumes, welfare, foreign exchange, value-added tax rate, lump-sum tax, skilled and unskilled labor's

wage, and the rental rate of capital.[329] As a result, these effects are explicitly discussed in this section.

4.3.1 Economic Effects of the Mauritius Sugar Export Price Reduction by the United States and Tariff Liberalization on Output Volumes

One of the key variables that characterize the Mauritian economy that will adjust due to the joint change in the sugar export price combined with the various tariff liberalization scenarios are the output quantities by sector. The eight separate runs reported in Table 31 display the changes by sector for the value-added tax replacement as well as the lump-sum tax replacement.

[329] All percentage changes are taken from the updated benchmark economy, or the updated benchmark, which is inclusive of the tariff changes that occur from 1997-2000 and the introduction of the value-added tax in 1998, with constant indirect taxes net of subsidies rates.

Table 31: Economic Effects of United States Sugar Price Reduction and Tariff Liberalization on Output Quantity by Sector (Percentage Change from Updated Benchmark)

Value-Added Tax Replacement

Sectors	A	B	C	D
Sugarcane	-14.05	-14.46	-15.14	-35.47
Other Agriculture	-7.09	-4.01	-4.56	-21.95
Sugar Milling	-13.31	-14.35	-14.96	-33.55
Export Processing Zone Manufacturing	8.35	3.47	3.96	19.59
Other Manufacturing	-5.43	-0.73	-1.30	-11.79
Electricity, Gas, and Water	-2.25	-0.39	-0.61	-5.99
Construction	-0.09	-0.02	-0.03	-0.20
Wholesale and Retail Trade and Repairs	-0.91	-0.77	-0.76	-1.18
Restaurants and Hotels	-6.69	-4.39	-5.15	-25.89
Transport, Storage, and Communication	-0.94	-1.20	-1.27	-4.11
Other Services	-4.14	-0.85	-1.00	-8.49

A: U.S. sugar price cut and TL with EU, with value-added tax replacement
B: U.S. sugar price cut and TL with SACU, with value-added tax replacement
C: U.S. sugar price cut and TL with U.S.-SACU, with value-added tax replacement
D: U.S. sugar price cut and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors	A	B	C	D
Sugarcane	-13.68	-14.45	-15.08	-34.56
Other Agriculture	-6.87	-4.00	-4.53	-21.41
Sugar Milling	-12.92	-14.33	-14.90	-32.59
Export Processing Zone Manufacturing	8.83	3.48	4.04	21.18
Other Manufacturing	-4.92	-0.71	-1.21	-10.28
Electricity, Gas, and Water	-1.01	-0.35	-0.41	-2.12
Construction	-0.09	-0.02	-0.03	-0.20
Wholesale and Retail Trade and Repairs	-2.10	-0.80	-0.96	-4.99
Restaurants and Hotels	-7.44	-4.42	-5.28	-27.94
Transport, Storage, and Communication	-1.84	-1.23	-1.42	-6.93
Other Services	-4.03	-0.85	-0.99	-8.14

A: U.S. sugar price cut and TL with EU, with lump-sum tax replacement
B: U.S. sugar price cut and TL with SACU, with lump-sum tax replacement
C: U.S. sugar price cut and TL with U.S.-SACU, with lump-sum tax replacement
D: U.S. sugar price cut and full unilateral tariff liberalization, with lump-sum tax replacement

The output volumes effects vary based on the tariff liberalization chosen. In the value-added tax and lump-sum tax scenarios, the largest percentage and absolute expansion still belongs to the Export Processing Zone Manufacturing sector. It is the only increasing sector for any simulation run. The EPZ sector's output percentage increases are as high as 21.18%, but are no less than 3.47%. The absolute increases for tariff liberalization with the European Union, Southern African Customs Union, the United States and the Southern African Customs Union, and with all of its trade partners with the value-added tax replacement are 5.5, 2.3, 2.6, and 12.9 billion rupees respectively, but are 5.8, 2.3, 2.7, and 13.9 billion rupees respectively across the various tariff liberalizations in the lump-sum tax replacement case.[330] As previously argued, the Export Processing Zone Manufacturing sector output volume increases because of the decrease in the price of the imported inputs it uses for production. Also, the cases in which devaluation of the rupee occurs (six of eight cases), the sector is favored because it is a key exporter and its goods become cheaper on the world market. Therefore, the increases are more pronounced than in the U.S. case (see Section 3.3.1) because of the sector being favored by lower imported input costs and in some cases. As previously shown, it is the second largest importer in the Mauritian economy comprising 34.4% of total import quantity in the updated benchmark and imports 53.7% of its total domestic supply. But these decreases are smaller in magnitude than those in the EU preferential price removal with tariff liberalization because only 3.77% of the total sugar exports are actually affected by the U.S. price change. Thus, the Export Processing Zone Manufacturing is the only sector with positive output volume changes and experiences sizable increases in percentage and absolute terms for every tariff liberalization scenario, regardless to

[330] The absolute output quantity changes are the Author's calculations from the simulation results.

the tax replacement, which are greater than the U.S. preferential price cut case alone, but smaller than in the EU price cut with tariff liberalization case, driven by cheaper imported inputs.

The largest increases in output occur with unilateral tariff liberalization and the EU TL cases in order of magnitude. However, the logic behind this finding is that the more regions that are affected by the tariff removal, the cheaper imported inputs would be across the board. Hence, the unilateral tariff liberalization case yields the largest output volume increase for the Export Processing Zone Manufacturing sector. But, since the European Union is 25.0% of the EPZ sector's total imports, the liberalization case with the EU included produces output changes of no less than 8.35%.[331] Hence, the output quantities of the EPZ sector increase by the greatest amount in the full unilateral tariff liberalization case, but also increase by a sizable amount in the European Union tariff liberalization case as well.

Furthermore, all other sectors suffer decreases in their output quantities. Once again the Sugarcane and the Sugar Milling sectors have the largest percentage decreases. However, the largest absolute declines belong to the Other Services sector for all tariff liberalization cases, the Other Manufacturing sector in the EU TL and the FUTL cases, and the Sugarcane and Sugar Milling sectors only have comparable decreases in output in the SACU and U.S.-SACU tariff liberalization cases. Therefore, I will discuss the Other Services, Other Manufacturing, Sugarcane, and the Sugar Milling sectors in that order. The Other Services sector experiences the largest absolute declines across the tariff liberalization cases for both tax replacement cases than all other sectors in the economy. In the value-added tax case, the decreases are –1.3 billion, -262 million, -308 million, and –2.6 billion rupees and are –1.2 billion, -261 million, -303

[331] Please reference the Author's calculations in the Benchmark Trade Shares of Mauritius 1997 table in Chapter 2 for regional share numbers by sector.

million, and –2.5 billion rupees in the lump-sum tax case for the four tariff liberalization cases respectively.[332] However, the Other Services sector, in the U.S. preferential price cut case, has positive output change for the value-added tax case and a negative change in the lump-sum tax case (see Section 3.3.1). This characteristic no longer holds where they all are strictly negative and sizable decreases because the Other Services sector is import-competing. It has the highest applied tariff rate in the Mauritian economy of 10.00% and thus its output decreases with tariff liberalization. When compared to the EU price cut case with tariff liberalization, the Sugarcane and Sugar Milling sectors decreases override the decreases in output in the Other Services sector. But, this makes sense given the sugar export price affects 95.34% of the total sugar exports in the European Union preferential price removal case, but, only 3.77% of the total sugar exports are affected by the U.S. price cut. But, the decreases are no greater than –2.6 billion, which falls below the maximum decrease of –2.7 billion in the EU price cut case with tariff liberalization. Hence, the Other Services sector experiences the largest absolute output volume declines in each tariff liberalization case and for both the value-added tax and lump-sum tax replacements that exceed the pure U.S. preferential price cut case, but are still smaller in magnitude than the EU price cut with tariff liberalization case.

The largest output volume changes occur in the full tariff liberalization case and in the European Union tariff liberalization case, with the FUTL case producing larger changes than the EU TL case. But, given the Other Services sector is import-competing, the more imports that are exposed to tariff liberalization, the more foreign competition it will face, and thus its output would be further depressed. Therefore, the largest decreases in output quantities occur in the unilateral tariff liberalization case, where 100% of tariffs are liberalized. However, the European

[332] The absolute output quantity decreases are the Author's calculations from the simulation results.

Union is over 30% of the total imports, on average, flowing into Mauritius from 1969-2003 and it is the single largest import region of origin in the economy. Thus, establishment of unilateral tariff liberalization with the European Union will increase the OSR sector's foreign competition, and thus decrease its overall output. Therefore, with full tariff liberalization, the output is depressed by the greatest extent because the liberalization increases the flow of import volume by the largest extent, followed by tariff liberalization with the EU.

In addition, other sizable output quantity decreases occur in the Other Manufacturing sector. In the value-added tax case, the decreases are –5.43%, -0.73%, -1.30%, and -11.79%, which equates to –1.1 billion, -143 million, -256 million, and –2.3 billion rupees absolute declines for the EU TL, SACU TL, U.S.-SACU TL, and the FUTL cases respectively. In the lump-sum tax case, the percentage decreases are –4.92%, -0.71%, -1.21%, and –10.28%, which produces absolute changes of –965 million, -140 million, -238 million, and –2.0 billion rupees for unilateral tariff liberalizations with the EU, SACU, U.S. and SACU jointly, and with all of its trade partners.[333] The OMA sector is the second largest decline in the EU TL case, the fifth largest in the SACU TL case, the third largest in the U.S.-SACU TL case, and is the second largest in the FUTL case. The sector also sells into every industry in Mauritius, with the largest consumption of inter-industry goods flowing into its own production (27.26%). Thus, its own output volume decline depresses its own production. In fact, 80.95% of its total inter-industry output would be negatively affected because each of its customers, except the EPZ sector, suffer output volume contractions.[334] But, this is in stark contrast to the U.S. preferential price removal case in that only positive output volume changes take place for the OMA sector. With tariff liberalization, the Other Manufacturing sector's output volumes actually decrease (see Table 16).

[333] The absolute output quantity changes are the Author's calculations from the simulation results.
[334] The sectoral shares of the OMA sector's inter-industry sales are the Author's calculations from Table 3.

However, the Other Manufacturing sector is also highly protected, with the third highest tariff rate levy of 7.60% (see Table 9). And, based on the stark declines in output with tariff liberalization, it appears that foreign goods are in direct competition with domestic manufactured goods, or rather that the sector is import-competing. The output volume decrease reflects the EU price cut with tariff liberalization case, but is smaller in magnitude because of less sugar exports being affected by the U.S. price change. Therefore, the Other Manufacturing sector experiences considerable decreases in its output volume for all tariff liberalization runs, never maintaining positive output quantity increases as in the U.S. preferential price case because it is import-competing, but is smaller in magnitude than the output quantity decreases suffered in the EU price cut with tariff liberalization case.

The largest output volume decreases occur in the EU TL and the FUTL cases. However, this is plausible using the same argument as previously presented with the OSR sector, namely the more liberalized the imports become, the larger decreases will occur in the OMA sector's output because it is import-competing. Thus, when tariffs are liberalized for the EU, the sector that comprises the largest share of total imports of the economy, 30.1%, it impacts a large portion of imports flowing into Mauritius. Furthermore, with 100% tariff liberalization, the largest influx of imports occurs and thus depresses the output of the Other Manufacturing sector because the OMA sector appears to have a difficult time competing with foreign goods. Hence, the largest declines of output volume occur in the full tariff liberalization case and the European Union tariff liberalization case, in order of magnitude, and applied across both tax replacement choices due to the amount of exposure to foreign competition in these cases.

Other notable decreases occur in the Sugarcane and the Sugar Milling sectors. However, the decreases are only comparable to the other absolute decreases in the SACU TL and the U.S.-

SACU TL.[335] The Sugarcane sector has a decline of [-14.46%, -15.14%] in the value-added tax case for the SACU and U.S.-SACU tariff liberalization cases, which translates into a –247 and -259 million rupees absolute change respectively. In the lump-sum tax case, the decreases are –247 and -257 million rupees across the tariff liberalization cases from the 14.45% and -15.08% changes respectively.[336] It exhibits the second largest declines in the economy for both the SACU and U.S.-SACU tariff liberalization cases. As previously shown, the Sugarcane sector contraction is closely tied to the Sugar Milling sector's output decreases because the Sugar Milling sector is its only consumer in the economy. The declines are larger than in the U.S. price cut case, but smaller than in the EU case. In the former case, the difference can be attributed to the Sugar Milling sector's output being further depressed because it is import-competing, so its output further contracts with tariff liberalization. Please note that for the Sugar Milling sector, the European Union and the Southern African Customs Union are the only sectors which import sugar into Mauritius, albeit small quantities. Therefore, the deep declines in the Sugarcane sector are dependent on the tariff removal of the SACU regions jointly, which raises the imports of sugar into the Mauritian economy in that it directly competes with its domestic sales since the region imports 89.5% of the total sugar exports into the economy. Hence, the demand for the Sugarcane sector diminishes. The decreases here are smaller in magnitude than the decreases in the European Union price cut case with tariff liberalization because only 3.77% of the total sugar

[335] The smallest amount being considered in the EU TL with value-added tax replacement is -1.1 billion rupees. The Sugarcane sector's output volume only decreases by –240 million rupees and the Sugar Milling sector by –187 million rupees. In the EU TL with lump-sum tax replacement, the smallest amount being considered is –965 million rupees, which far exceeds the –234 and –182 million rupees for the Sugarcane and the Sugar Milling sectors respectively. Thus, they will not be discussed in that scenario. But, the SUG and SMI sectors will not be discussed for the full unilateral tariff liberalization cases as well. The amounts of interest are –2.3 billion rupees and –2.0 billion rupees for the value-added and lump-sum tax replacements respectively. The Sugarcane and Sugar Milling sectors' output volumes only decrease by –606 million and –472 million rupees respectively in the value-added tax case and by –591 and –459 million rupees in the lump-sum tax case, much smaller changes in comparison to relevant decreases.

[336] The absolute output quantity decreases are the Author's calculations from the simulation results.

exports are affected by a price change rather than 95.34% of total sugar exports. Thus, the Sugarcane sector suffers deep and comparable contractions in its output volume in the SACU TL and the U.S.-SACU TL cases because its only customer, the Sugar Milling sector faces increased competition from the SACU and is import-competing.[337]

In the case of the Sugar Milling sector, decreases in output occur as well. There is an –202 and -211 million rupees decrease in the value-added tax case for the SACU and U.S.-SACU tariff liberalizations and a –202 and -210 million rupees decrease in the lump-sum tax case for each tariff liberalization scenario. However, as before, the Sugar Milling sector is the sector in which the sugar export price was affected since it is the sole exporter of sugar exports for Mauritius. The steep decreases in output then are from the loss of preferential pricing. But, greater decreases occur here than in the pure U.S. preferential price removal case alone because sugar import volume increases and it is import-competing. The Sugar Milling sector has an applied tariff rate of 10.00%, the highest in the economy. And, as protection is removed for the region that imports 89.5% of the total sugar imports, SACU, the output volume for the Sugar Milling sector falls. Furthermore, in reference to the EU price cut scenario with tariff liberalization, the changes are smaller in magnitude. And, this follows from only 3.77% of the total sugar exports being affected by the price cut by the United States rather than 95.34% in the EU case. Hence, the Sugar Milling sector's decreases are comparable in the SACU and U.S.-SACU TL simulation runs, although they are sizable for all runs, much larger than the U.S. price

[337] The full unilateral tariff liberalization case is where it incurs the largest decrease in its output volume. But, this can be explained given the declines in the SUG sector's output occurs when the EU and the SACU tariffs are jointly removed. The EU sector comprises 10.5% of the total sugar imports flowing into the economy and the SACU imports 89.5% of the total imports for sugar. Thus, changes in tariff policy with either, especially the SACU, will greatly affect sugar import flows. The flow of imports peaks when tariff liberalization is performed for the European Union and the Southern African Customs Union together. Therefore, the full unilateral tariff liberalization cases for the Sugarcane sector produces the largest output volume contractions.

cut case alone because the SMI sector is import-competing and much smaller than the decrease it suffers in the EU price cut case with tariff liberalization.[338]

The EPZ sector is the only sector with positive output volume activity and the changes are larger than its U.S. price cut case alone because it is import dependent, but less than in the EU preferential price cut with tariff liberalization because of the amount of sugar exports affected by the U.S. price cut. The output quantities increases are most pronounced in the unilateral tariff liberalization case with all of its trade partners, but also increases by a substantial amount in the European Union tariff liberalization case. On the other hand, the largest percentage decreases occur in the Sugarcane and the Sugar Milling sectors. However, the largest absolute declines occur in the OSR sector for every tariff liberalization case and tax replacement choice, the OMA sector in the EU, U.S.-SACU, and the full unilateral tariff liberalization cases primarily, and in the SUG and the SMI sectors, where the decreases are only comparable in the SACU and U.S.-SACU cases. The Other Services sector's largest decreases occur in the full unilateral tariff liberalization case followed by substantial changes in the EU tariff liberalization case because the sector is import-competing. Also, the Other Manufacturing sector suffers a decrease in output because it too is import-competing and loses its high level of protection. And, the largest negative output effects occur in the unilateral tariff liberalization case followed by the tariff liberalization with the EU. The Sugarcane sector's output volume falls because its only customer faces increased competition via tariff liberalization and is import-competing and hence

[338] The full unilateral tariff liberalization case is where the SMI sector suffers its largest contraction. However, larger output quantity changes are necessary given that more of the total imports are affected with the removal of tariffs for all trade partners. But, Sugar Milling output decreases by the most in the cases where the EU and SACU tariff liberalization occurs jointly, and the unilateral tariff liberalization case is where this occurs. Again, the decrease is so pronounced here because it is import-competing and the EU and SACU regions are the only regions that import sugar into the Mauritian economy. Thus, full tariff liberalization causes the largest contraction in the output quantity for the Sugar Milling sector because it is import-competing.

suffers an output decrease. Lastly, the Sugar Milling sector's output volume declines because it loses its protection and it is import-competing.

4.3.2 Economic Effects of the Mauritius Sugar Price Reduction by the United States and Tariff Liberalization on Export Volume by Sector

The export quantity will change based on the 45% decrease in the preferential price of sugar by the United States and the establishment of free trade areas with the EU, SACU, U.S. and SACU, and with all of its trade partners. Table 32, will outline the various changes of export quantities by sector for all tax replacement choices.

Table 32: Economic Effects of the United States Sugar Price Reduction and Tariff Liberalization on Export Quantity by Sector (Percentage Change from Updated Benchmark)

Value-Added Tax Replacement

Sectors*	A	B	C	D
Other Agriculture	-10.47	-4.57	-5.37	-29.42
Sugar Milling	-19.53	-18.01	-18.86	-44.13
Export Processing Zone Manufacturing	8.55	3.51	4.01	20.24
Other Manufacturing	-5.35	0.42	-0.11	-11.17
Electricity, Gas, and Water	-0.79	0.19	0.09	-4.97
Wholesale and Retail Trade and Repairs	-3.62	-1.92	-2.16	-10.84
Restaurants and Hotels	-7.93	-5.12	-6.04	-30.53
Transport, Storage, and Communication	-1.69	-1.79	-1.98	-9.31
Other Services	-4.15	-1.44	-1.73	-12.51

A: U.S. sugar price cut and TL with EU, with value-added tax replacement
B: U.S. sugar price cut and TL with SACU, with value-added tax replacement
C: U.S. sugar price cut and TL with U.S.-SACU, with value-added tax replacement
D: U.S. sugar price cut and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors*	A	B	C	D
Other Agriculture	-10.24	-4.56	-5.33	-28.89
Sugar Milling	-19.22	-18.00	-18.81	-43.43
Export Processing Zone Manufacturing	9.02	3.52	4.09	21.82
Other Manufacturing	-4.81	0.44	-0.02	-9.57
Electricity, Gas, and Water	0.54	0.21	0.23	-0.86
Wholesale and Retail Trade and Repairs	-4.69	-1.95	-2.34	-14.02
Restaurants and Hotels	-8.60	-5.15	-6.15	-32.33
Transport, Storage, and Communication	-2.50	-1.81	-2.11	-11.78
Other Services	-3.93	-1.44	-1.69	-11.88

A: U.S. sugar price cut and TL with EU, with lump-sum tax replacement
B: U.S. sugar price cut and TL with SACU, with lump-sum tax replacement
C: U.S. sugar price cut and TL with U.S.-SACU, with lump-sum tax replacement
D: U.S. sugar price cut and full unilateral tariff liberalization, with lump-sum tax replacement

*Only the sectors with positive export volumes are recorded in this table. Therefore, the Sugarcane and the Construction sectors are not included here. Also, the Electricity, Gas, and Water sector would not have any positive export volume had it not been assigned an amount through the application of the calculated supply shares to the exports of goods and services, a mechanism which is applied to usage values to ensure the share of production of a composite good is assigned to each producer of that good, because it is applied to final demand values as well.

The export quantity table yields valuable information concerning the sectors that are favored and harmed by the joint sugar price and tariff liberalization changes. In the value-added tax case scenario, the Export Processing Zone Manufacturing (for all trade cases), the Other Manufacturing (for SACU alone), and the Electricity, Gas, and Water (for the EU FTA with lump-sum replacement, SACU FTA with lump-sum tax replacement, and U.S.-SACU with lump-sum tax replacement) sectors all experience increases in export quantities.[339] All aforementioned cases are much smaller in magnitude than the changes in the EPZ sector, with the highest increase of 15 million rupees occurring, whereas in the EPZ sector, the absolute increases are no less than 2.1 billion rupees. Thus, the only sector with significant absolute increases is the Export Processing Zone Manufacturing sector. For the EU TL, SACU TL, U.S.-SACU TL, and the unilateral tariff liberalization, the increase in export quantity is 5.1, 2.1, 2.4, and 12.0 billion rupees respectively for the value-added tax replacement and is 5.3, 2.1., 2.4, and 12.9 billion rupees for the lump-sum tax replacement. The Export Processing Zone Manufacturing sector percentage and absolute increases are sizable across all tariff liberalization cases. As previously shown, it exports 87.9% of its total domestic supply and is the largest exporter in the economy, comprising 80.95% of the total export quantity in the updated economy, such that increases in output translate to increases in exports.[340] Again, output volume increases translate into export volume increases because the EPZ sector is such a dominant

[339] The Other Manufacturing sector increases its export quantity as well. The Other Manufacturing sector only increases its exports by 0.42% in one case, the Southern African Customs Union tariff liberalization. The OMA sector is highly protected, with the third largest tariff levy. Thus, the removal of the tariff in this case increases total imports. But, in the SACU tariff liberalization, the SACU region accounts for 14.8% of the OMA sector's total imports, but does not depress the total export quantity of the OMA sector given that the influx is not large enough to depress total output by a large amount. The reasoning behind this phenomenon could be that the SACU imports may not compete as staunchly as some other imports do with the OMA sector's goods. The Electricity, Gas, and Water sector has an increase in export quantity in the SACU, U.S., and U.S.-SACU tariff liberalization cases of 0.19%, 0.63%, and 0.09% respectively. In the EGW case, the positive export quantity is directly from a supply percentage being used and will not be discussed.

[340] Author's calculations.

exporting sector in the Mauritian economy. The EPZ sector increases its exports by an even larger extent than occurs in the U.S. preferential price removal case alone because it is favored by the decreasing tariffs. It is also a large consumer of imported inputs, demanding 34.40% of the total import quantity in the updated benchmark, or rather the second largest share in the economy. As a result, cheaper imported inputs causes its production costs to fall and hence the sector's output volume rises, increasing the output of exports from the sector. But, the difference between this case and the European Union preferential price removal with tariff liberalization case is that its changes are smaller in magnitude simply because the 95.34% of the sugar exports are not affected by the price change, but only 3.77% by the U.S. price cut. Therefore, the Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sectors all experience positive percentage changes, with the EPZ sector experiencing the largest and most substantial export quantity increases, percentage and absolute, across all tariff liberalization scenarios, outweighing the increases found in the U.S. price cut case alone mainly because of output quantity increases in the sector and it being a key exporting sector in the economy, but is smaller than in the EU price cut case with tariff liberalization because only 3.77% of the total sugar exports are affected here.

The largest export volume changes occur in the EU and full unilateral tariff liberalization cases, with the latter case producing the largest increases. When the European Union tariff liberalization takes place, increases in exports are no less than an 8.55%. The reasoning is as previously given, that the greatest discount on imported inputs occur when the EU tariff is made zero because it is 25.0% of the total imports that flow into the EPZ sector, allowing for increased production, which in turn allows for increased exports. The largest export quantity increase occurs in the full unilateral tariff liberalization case because of the reliance of the EPZ sector on

imported inputs, the larger the scope of tariff liberalization, the more positively the sector is impacted. This would then boost exporting capacity. Hence, a move from 25% to 100% of the total imports liberalized increases its total export volume. In essence, the EPZ sector's export volume increases are concurrent with its output volume increases and are largest in the full tariff liberalization case, followed by the EU tariff liberalization case.

The export quantities decrease for all other sectors across. In the value-added and lump-sum tax cases, the key percentage contraction are the Sugar Milling, Restaurants and Hotels, and the Other Agriculture sectors, but in absolute changes, the greatest declines are in the Sugar Milling, Other Manufacturing, and the Other Services sectors. In the SMI sector, the decreases are –140, -129, -136, and –319 million rupees in the EU TL, SACU TL, U.S.-SACU TL, and the FUTL cases respectively for the value-added tax replacement. The decreases in the lump-sum tax scenario across the four trade liberalization cases are –138, -129, -135, and –314 respectively.[341] As previously shown, because the Sugar Milling sector experiences the sugar export price loss for the United States which depresses its total output by a substantial amount, output quantity decreases and hence export quantity decreases occur because it is a sector that exports 88.3% of its total domestic supply. Also, the Other Manufacturing sector's output contracts and since it is the SMI sector's largest inter-industry customer, its output decreases. The Sugar Milling sector is also a highly protected sector with a tariff of 10.00%, the highest levied rate in the economy. But with tariff liberalization as opposed to the U.S. price cut alone, the larger the increases in imports, the smaller the sector's total output because its goods are import-competing as well which would cause the export quantities to fall even further. But, in comparison to the EU price cut with tariff liberalization case, the export quantity contracts by a

[341] The absolute changes in export quantity are the Author's calculations from the simulation results.

smaller amount, again due to the scope of the exports that are affected by the U.S. price cut. Thus, the Sugar Milling suffers sizable decreases in its export quantities with tariff liberalization because of depressed output quantities through foreign competition, which are greater than the U.S. price cut case alone, but less than the EU price cut with tariff liberalization case.

Here, the largest declines in exports occur when the unilateral tariff liberalization case is in effect. But, the unilateral tariff liberalization runs allow for tariff liberalization for the only two regions that import sugar into the economy, the EU and the SACU. But again, with the Sugar Milling sector being highly protected, with an average applied tariff rate of 10.00% (i.e. the largest levy in the economy), it is most adversely affected by tariff liberalizations with these regions because its goods compete with the imported sugar. Thus, its output is further depressed and its exports contract. Thus, the unilateral tariff liberalization case yields the largest decreases in export volume for the Sugar Milling sector.

The Other Manufacturing sector suffers significant export declines in the EU and in the full unilateral tariff liberalization cases with value-added and lump-sum tax replacement.[342] The corresponding declines, in percentage and absolute terms, for the EU TL and the FUTL cases in the value-added tax cut scenario are –5.35% and –11.17% or rather, -191 and –399 million rupees respectively. In the lump-sum tax case, the EU TL case contract by –4.81%, yielding a decrease of –172 million rupees and the FUTL case contracts by –9.57%, which produces a –342 million rupees decrease.[343] This is the largest decrease in the EU TL cases but represents the third and fourth largest decreases in the full unilateral tariff liberalization case in the value-added and lump-sum tax replacements respectively. The OMA sector's output contracts also because

[342] The declines not considered are the SACU TL and the U.S.-SACU TL cases because the export quantities actually increase in the SACU TL case and only decrease by, at the most, -4 million rupees in the U.S.-SACU TL case.
[343] The absolute export volume declines are the Author's calculations from the simulation results.

all sectors except the EPZ sector experience output contractions and the OMA sector sells into every sector in the economy, which would further depress export volumes because of lower output volumes. In the U.S. price cut case, the Other Manufacturing sector increases its export volume in the value-added tax case and decreases it by a small amount in the lump-sum tax case (see Table 17).[344] Here, with tariff liberalization with the European Union, since the EU accounts for 39.6% of the total imports and is highly protected with an applied tariff rate of 7.60%. So, with such a large portion of its imports being liberalized and it is import-competing, its export volume declines because of depressed output. So, the more regions for which tariff liberalization occurs, the more its export volume will contract because it is an import-competing sector. Thus, with the maximum amount of imports affected by tariff liberalization, it loses its protection from tariff liberalization and output falls by the greatest extent because foreign competition is at its peak. Therefore, the FUTL case produces the largest export declines for this sector. In comparison to the EU price cut with tariff liberalization scenario, the export quantity declines are smaller. And, as before, the smaller changes are indicative of only 3.77% of the total sugar exports being affected by the U.S. price cut. Hence, the OMA sector experiences comparable export volume contractions in the EU TL and the FUTL runs with value-added and lump-sum tax replacement because it loses its protection and is import-competing, where its export volume always reflects a decline, unlike the U.S. preferential price case, but its decreases are smaller than in the EU preferential price with tariff liberalization case.[345]

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[344] The only increases that occur here are in the SACU tariff liberalization case because it involves a region that impacts only 14.8% of the total imports of the OMA sector itself.

[345] The largest export volume declines occur in the unilateral tariff liberalization case. But, as previously mentioned, the sector's output volume is depressed by the largest extent there because it is import-competing. And, since the OMA sector exports 20.6% of its total domestic supply, one would expect the decreased output volume to filter into its exports. And, it does. Hence, the export quantity for the OMA sector is most negatively impacted in the unilateral tariff liberalization case.

The Other Services sector also suffers considerable export quantity declines. However, they only occur in the European Union and the full unilateral tariff liberalization trade scenarios. The absolute changes are –174 and –522 million rupees respectively in the value-added tax replacement and –165 and –497 million rupees in the lump-sum tax case. However, 99.26% of the OSR sector's inter-industry demand falls because of output volume declines. Each of its key consumers contract by the largest extent in the EU TL and FUTL policy implementations, where the Other Services, Transport, Storage, and Communication, and the Restaurants and Hotels sectors comprise 10.57%, 23.65%, and 46.23% of the OSR sector's inter-industry sales, its output volumes decrease and hence its export quantity.[346] The changes are always negative here, unlike the U.S. price cut case alone, where they were positive and negative (see Table 17). But, with the OSR sector being highly protected at a 10.00% tariff rate levy and being import-competing, its export quantity is adversely affected by additional downward pressure on its production. The EU is 70.6% of its import volume. When EU TL is implemented, a substantial portion of its imports is liberalized, exposure to foreign competition increases greatly, and the sector's output, and hence its export volume decreases. When 100% of the imports are liberalized, this effect is simply magnified. When compared to the EU price cut with tariff liberalization case, there is still a smaller change occurring in the U.S. case with trade liberalization because of the total amount of sugar exports being affected by the U.S. price cut (3.77%). Thus, the Other Services sector suffers notable decreases in its export quantity in the EU TL and in FUTL cases, which are always negative, unlike the U.S. price cut case alone,

[346] The percentage of the total inter-industry output affected by the decreases and the sectoral shares of inter-industry sales are the Author's calculations from Table 3.

because it is import-competing, and decreases are less than in the EU price cut case with tariff liberalization because it only affects 3.77% of the total sugar exports.[347]

The Lerner Symmetry appears to be in effect here as well. The export volumes increase for the EU TL, SACU TL, U.S.-SACU TL, and for the FUTL cases. In particular, the aggregate export volume increases are 5.92%, 2.38%, 2.71%, and 13.46% respectively in the value-added tax case and are 6.30%, 2.40%, 2.77%, and 14.70% respectively in the lump-sum tax replacement scenario. Again, as in the EU price cut case with tariff liberalization, the unilateral tariff liberalization produces the largest increases in export volumes as expected. In essence, support for import tariff bias against exports is displayed here as well.

All in all, the Export Processing Zone Manufacturing sector (for all cases) increases for the value-added tax and lump-sum tax replacement, along with smaller increases in the Other Manufacturing sector (two of eight cases) and the Electricity, Gas, and Water sector (for five of eight cases). The only significant absolute increases belong to the Export Processing Zone Manufacturing sector. The changes are more pronounced than in the U.S. price cut case alone, because it is import dependent and is thus favored by tariff liberalization, but are smaller than in the EU price cut with tariff liberalization because 3.77% of the sugar exports are affected. The main percentage decreases in exports occur in the Sugar Milling, Restaurants and Hotels, and the Other Agriculture sectors, but in absolute terms, the Sugar Milling, Other Manufacturing, and the Other Services sectors incur the most substantial decline in their export quantities. The Sugar

[347] Once again, the largest export declines occur with the establishment of a unilateral free trade agreement. However, given that the Other Services sector is import-competing, the larger the magnitude of goods covered by tariff liberalization, the more depressed its output and hence export quantities will be because of it. When all tariffs are liberalized, the greatest influx of imports occurs and hence the most foreign competition exists on the domestic market. All in all, the unilateral tariff liberalization runs produce the largest declines in total export quantity for the Other Services sector.

Milling sector's output further contracts with tariff liberalization because it is import-competing, falling by more than in the U.S. case, but by less than in the EU preferential price removal with tariff liberalization case. The SMI sector's export volumes decrease the most in the unilateral tariff liberalization case because it is import-competing. The Other Manufacturing and Other Services sectors' export quantities by a substantial amount in the EU TL and the FUTL case only because their high level of protection is removed and they are import-competing. They decrease by more than the decreases they incur in the U.S. price cut case, but the changes are smaller in magnitude than in the EU price cut with tariff liberalization case. Lastly, tariff liberalization favors exports, removing the Lerner Symmetry effect that decreases export volume.

4.3.3 Economic Effects of the Mauritius Sugar Price Reduction by the United States and Tariff Liberalization on Import Volumes by Sector

Another variable that changes based on the adoption of the world price by the United States for Mauritius' sugar exports and the four tariff liberalization scenarios is the import quantity. In this section, Table 33 will detail the various effects of these policies on the import volumes. It is as follows:

Table 33: Economic Effects of the United States Sugar Price Reduction and Tariff Liberalization on Import Quantity by Sector (Percentage Change from Updated Benchmark)

Value-Added Tax Replacement

Sectors*	A	B	C	D
Other Agriculture	1.81	5.09	5.00	14.59
Sugar Milling	7.23	20.26	20.44	32.32
Export Processing Zone Manufacturing	7.12	2.95	3.34	17.14
Other Manufacturing	3.53	1.37	1.67	7.29
Restaurants and Hotels	0.31	-0.29	-0.18	2.93
Transport, Storage, and Communication	0.22	-0.29	-0.15	4.46
Other Services	17.36	0.91	1.03	26.08

A: U.S. sugar price cut and TL with EU, with value-added tax replacement
B: U.S. sugar price cut and TL with SACU, with value-added tax replacement
C: U.S. sugar price cut and TL with U.S.-SACU, with value-added tax replacement
D: U.S. sugar price cut and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors*	A	B	C	D
Other Agriculture	2.03	5.09	5.03	15.31
Sugar Milling	7.87	20.28	20.56	34.79
Export Processing Zone Manufacturing	7.68	2.97	3.44	18.98
Other Manufacturing	4.05	1.39	1.75	9.01
Restaurants and Hotels	-0.83	-0.33	-0.36	-0.82
Transport, Storage, and Communication	-0.81	-0.32	-0.32	1.02
Other Services	17.35	0.91	1.02	26.07

A: U.S. sugar price cut and TL with EU, with lump-sum tax replacement
B: U.S. sugar price cut and TL with SACU, with lump-sum tax replacement
C: U.S. sugar price cut and TL with U.S.-SACU, with lump-sum tax replacement
D: U.S. sugar price cut and full unilateral tariff liberalization, with lump-sum tax replacement

*Only the sectors with positive import volumes are recorded in this table. Therefore, the Sugarcane, Electricity, Gas, and Water, Construction, and the Wholesale and Retail Trade and Repairs sectors are not included here.

There are several notable features concerning the import quantity changes found in this table. First, the Other Agriculture, Sugar Milling, Export Processing Zone Manufacturing, Other Manufacturing, and the Other Services sectors experience strictly positive percentage changes for both the value-added and lump-sum tax replacements. Within the import quantity increases, the absolute changes are most pronounced for the EPZ sector (for all tariff liberalization runs), the OMA sector (for all tariff liberalization simulations), and the OSR sector (for the EU FTA and the unilateral tariff liberalization cases only).[348] The Export Processing Zone Manufacturing sector has the largest absolute increases for all tariff liberalization cases. With the value-added tax replacement, the import quantities increase by 1.9 billion, 796 million, 902 million, and 4.6 billion rupees across the four tariff liberalization scenarios respectively. In the lump-sum tax case, the Export Processing Zone Manufacturing sector's import volume increases by 2.1 billion, 801 million, 929 million, and 5.1 billion rupees.[349] However, the EPZ sector is, as previously stated, the second largest import consumer in the Mauritian economy, with a 34.40% share of the total import quantity in the updated benchmark. These import quantity increases are larger than in the U.S. price cut case alone because with tariff liberalization, the EPZ sector's imported inputs are cheaper. As a result, because of its substantial dependence on imported goods for production increases in production readily translate into increases in import quantity as well. The increases also occur because of the loss of protection, which is only a small levy of

[348] The next closest increases pale in comparison to the lowest sectoral increases considered: 836 vs. 54 million rupees, 499 vs. 150 million rupees, 607 vs. 147 million rupees, and 1.3 billion rupees vs. 431 million rupees in the value-added tax case for the EU TL, SACU TL, U.S.-SACU TL, and the FUTL runs respectively. In the lump-sum tax case, the absolute increases of comparison are 836 vs. 60 million rupees, 504 vs. 150 million rupees, 639 vs. 149 million rupees, and 1.3 billion vs. 453 million rupees. Thus, the only the EPZ, OMA, and the OSR sectors will be addressed in detail.

[349] The absolute import volume increases are the Author's calculations from the simulation results.

2.91%.[350] In comparison to the EU price cut with tariff liberalization simulation runs, the increases are smaller here. Again, the 3.77% of the total sugar exports having their price to fall is considerably lower than 95.34% of the total sugar exports being affected. Hence, the EPZ sector experiences the largest import quantity increases with tariff liberalization, much larger than the U.S. price cut case alone because it is import dependent, but by a smaller amount than its EU counterpart because the U.S. price cut only affects 3.77% of the total sugar exports.

The most sizable increases in the import quantity occur in the full unilateral tariff liberalization run and secondarily so in the European Union tariff liberalization case. Since the Export Processing Zone Manufacturing sector is heavily import dependent, the larger the scope of the tariff liberalizations, the more output it can produce because of cheaper input costs. So, the 100% tariff liberalization causes the largest inflow of goods and services into the economy. However, the European Union is the single most pertinent sector of import origin in that it imports 25% of the total imports flowing into the EPZ sector, tariff liberalization with this region causes a considerable increase in import quantities as well. Therefore, the full and EU tariff liberalization simulation runs produce the most prominent import volume increases in the Export Processing Zone Manufacturing sector.

The import volume in the Other Manufacturing sector also increases by a substantial amount. Import quantities rise by [1.37%, 7.29%] in the value-added tax case and by [1.39%, 9.01%] in the lump-sum tax case. These percentage changes equate to a 1.3 billion rupees increase in the European Union tariff liberalization case, a 499 million rupees increase in the

[350] The increases in import quantity are not driven by the loss of protection as much as the increase in output. The Export Processing Zone Manufacturing sector only has an applied average tariff rate of 2.91%. Again, the EPZ sector imports 53.7% of its total domestic supply and it is the second largest importer in the market. Therefore, since imported inputs are used for production, the increases shown in output volume are expected to cause increases in import quantities. The latter case is responsible for the majority of the import quantity increases exhibited.

Southern African Customs Union case, a 607 million rupees in the joint U.S. and the SACU tariff liberalization case, and a 2.7 billion rupees in the unilateral tariff liberalization case with value-added tax replacement and a 1.5 billion, 504 million, 639 million, and 3.3 billion rupees increase respectively in the lump-sum tax replacement case.[351] However, the substantial increases in the import quantities for the OMA sector are not strange for two reasons. One reason is that the Other Manufacturing sector is the largest importing sector in the Mauritian economy, with a 46.42% share of the total import quantity in the updated benchmark.[352] The other reason is that it is a highly protected sector, with an applied tariff rate of 7.60%, the third highest tariff levy in the economy. Thus, the import quantities increase more in this case than in the U.S. price cut case alone because of import tariff liberalization, given that the sector is also heavily import dependent. But, the U.S. preferential price removal with tariff liberalization still does not expand by as much as the equivalent EU case because the sugar export quantity affected by the sugar price cut in this case is smaller than in the EU case. Thus, the Other Manufacturing sector has considerable increases in its overall import quantity, regardless to the tariff liberalization case or tax replacement chosen, by a greater extent than what occurs in the pure U.S. price cut case alone because of its import dependence and loss of protection, but by less than what occurs in the European Union's equivalent case because less sugar exports are affected by the U.S. price cut.

The largest increases in import quantity still occur in the FUTL and in the EU TL cases, with the former case producing a greater import quantity increases than the latter. But, to have tariff removal for all goods and services will increase the import quantity by the greatest extent

[351] The absolute import quantity increases are the Author's calculations from the simulation results.
[352] The sectoral share total of import quantity in the updated benchmark is the Author's calculations from the simulation results.

because of dependence on imported inputs. However, as previously stated, the EU is 39.6% of the total imports of the OMA sector, so tariff liberalization with that region will affect a considerable portion of the sector's overall imports, and hence, will allow for larger purchases of imported inputs because they are cheaper. Therefore, the full unilateral tariff liberalization and the EU TL cases, in order of magnitude, yield the largest import quantity increases for the OMA sector because of imported input dependence and a high level of protection being removed.

Lastly, the Other Services sector incurs notable import quantity increases as well. However, the only sizable increases occur in the EU TL and the full tariff liberalization cases.[353] The increases for the value-added and lump-sum tax cases are 836 million rupees and 1.3 billion rupees across each tariff liberalization case. But, as expected, the import quantity increases given that one of the most highly protected sectors, with an average applied tariff rate of 10.00%, the largest levy of tariffs on imports in the economy, goes to zero. The changes are so significant in the EU TL and the FUTL cases because the European Union is 70.6% of the sector's total imports. Thus, tariff liberalization produces the drastic increases in its import quantity in the EU TL case. But, this also occurs for the full unilateral tariff liberalization cases, where 100% of the goods and services are liberalized. The significance here is that the maximum amount of goods and services lose their protection. The import quantity increases here as opposed to always decreasing as in the U.S. price cut case (see Section 3.3.3.) because of the loss of protection. With the European Union price cut with tariff liberalization case, the decreases are more prominent because the scope of the sugar exports affected by the change in the EU price. Therefore, the Other Services sector's import quantities increase by the greatest extent in the FUTL case followed by the EU TL case because of the loss of protection, undergoing the

[353] The OSR sector only increases by 44 and 50 million rupees for the SACU TL and U.S.-SACU TL simulations runs respectively in both the value-added and the lump-sum tax replacements. So, they are not considered.

opposite change that is found in the U.S. price cut case singularly due to tariff barriers being removed and it is smaller in magnitude than the decreases in the EU price cut with tariff liberalization case because of the smaller amount of total sugar exports affected by the U.S. price change.

Moreover, the Restaurants and Hotels as well as the Transport, Storage, and Communication sectors suffer import quantity increases and decreases. With the value-added tax they only suffer minute decreases in the SACU TL and the U.S.-SACU TL cases. But, in the lump-sum tax replacement scenario, the Restaurant and Hotels sector decreases for all tariff liberalization runs and the Transport, Storage, and Communication sector import quantities decrease for all but the unilateral tariff liberalization scenario. Since the changes are minute for the RAH sector, with decreases that are as negative as –16 million rupees but as small as –3 million rupees, and the changes are more negative for the TSC sector, which suffers import quantity contractions of –39 million to –8 million, neither sector will be discussed further.

With the United States removing the preferential price for sugar exports with tariff liberalization, the import volume of the economy increased for all tariff liberalization cases and tax replacement choices. In the EU TL, SACU TL, U.S.-SACU TL, and the FUTL scenarios, the aggregate import volume increases are 5.29%, 2.01%, 2.30%, and 12.00% respectively in the value-added tax case and are 5.65%, 2.02%, 2.36%, and 13.17% respectively in the lump-sum tax case. The largest increases, of course, occur in the full tariff liberalization case. Thus, the aggregate import quantity increases for all tariff liberalization simulation runs.

In conclusion, the import quantities increase for the Other Agriculture, Sugar Milling, Export Processing Zone Manufacturing, Other Manufacturing, and Other Services sectors, with the most substantial absolute increases occurring in the Export Processing Zone Manufacturing,

Other Manufacturing, and the Other Services sectors. The largest increase occurs in the EPZ sector, where its import dependence and total output quantity increases drive its increases in import quantity, which occurs by a greater extent than in the pure U.S. price cut case, but by less than in the EU equivalent case. The largest increases in import volume occur for the sector in the full unilateral tariff liberalization case. Furthermore, the Other Manufacturing sector incurs sizable increases in import quantity because of its import dependence and loss of protection, by more than the U.S. case, but by less than the EU price cut with tariff liberalization case. Again the EU and the full unilateral tariff liberalization cases yield the largest increases in import volume for this sector. Lastly, the Other Services sector has notable increases in its import volume in the EU TL and FUTL cases because of its loss of protection. The increases that occur, being the opposite of the United States preferential price removal case because of the loss in protection effects, but with the EU price cut with tariff liberalization increases are larger in magnitude than this case because of less total sugar exports being affected by the U.S. price cut than the EU price cut. With the decreases, the Restaurant and Hotels and the Transport, Storage, and Communication sectors are the only two sectors with import decreases, but they are minute across all tariff liberalization scenarios. Lastly, the aggregate import volumes increase regardless to the tariff liberalization policy implemented or the tax replacement choice.

4.3.4 Economic Effects of the Mauritius Sugar Export Price Reduction by the United States and Tariff Liberalization on Welfare, Foreign Exchange, and the Replacement Taxes

The removal of the United States preferential pricing for Mauritius' sugar exports coupled with unilateral tariff liberalization with the European Union, the Southern African

Customs Union, the United States and the Southern African Customs Union, and with all trade partners will affect the welfare, real foreign exchange rate, and the value-added and lump-sum taxes. Thus, the section will present the changes in the welfare, foreign exchange, and the replacement taxes. Table 34 displays the adjustments that occur for each variable listed above for value-added tax and lump-sum tax replacement.

Table 34: Economic Effects of the United States Sugar Price Reduction and Tariff Liberalization on Welfare, Foreign Exchange, Value-Added Tax Rate, and Lump-Sum Taxation (Percentage Change from Updated Benchmark Except Lump-Sum Tax)

Value-Added Tax Replacement

Sectors	A	B	C	D
Welfare	-0.40	-0.10	-0.16	-0.50
Foreign Exchange Rate (e)*	-0.84	0.21	0.04	-3.95
Value-Added Tax Rate	33.91	1.05	5.56	112.63
Lump-Sum Tax (Billions of Rupees)	-	-	-	-

A: U.S. sugar price cut and TL with EU, with value-added tax replacement
B: U.S. sugar price cut and TL with SACU, with value-added tax replacement
C: U.S. sugar price cut and TL with U.S.-SACU, with value-added tax replacement
D: U.S. sugar price cut and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors	A	B	C	D
Welfare	-0.30	-0.10	-0.14	-0.18
Foreign Exchange Rate (e)*	0.72	0.26	0.30	1.02
Value-Added Tax Rate	-	-	-	-
Lump-Sum Tax (Billions of Rupees)	1.18	0.04	0.20	3.88

A: U.S. sugar price cut and TL with EU, with lump-sum tax replacement
B: U.S. sugar price cut and TL with SACU, with lump-sum tax replacement
C: U.S. sugar price cut and TL with U.S.-SACU, with lump-sum tax replacement
D: U.S. sugar price cut and full unilateral tariff liberalization, with lump-sum tax replacement

*e is defined as Rupees per Foreign Currency.

Table 34 displays several interesting findings. With the various tariff liberalizations, the welfare further decreases under both the value-added tax case and the lump-sum tax case. The value-added tax rate reflects decreases of –0.40%, -0.10%, -0.16%, and –0.50% for the EU TL, SACU TL, U.S.-SACU TL, and the FUTL cases respectively. In the lump-sum tax cases, the contractions in welfare are –0.30%, -0.10%, -0.14%, and –0.18% for the various trade policy changes respectively. In each case, these are larger decreases than what is reflected in the U.S. price cut case alone. The tariff liberalization added up to –0.55% to previous welfare in the value-added tax case and up to –0.29% in the lump-sum case under the United States sugar price cut case alone.[354] The further reductions in welfare show that every tariff liberalization choice considered is an inefficient policy conditional on removing the U.S. preferential price for sugar exports from Mauritius. One reason may be that the value-added tax rates are scaled by as much as 112.63% in the unilateral tariff liberalization case with all trade partners. This is a distortionary tax which, based on its levies by sector, can cause certain sectors to increase output under import competition that would not have normally done so if the levy of the value-added tax wasn't favorable.[355] The results may signify that the excess burden of the tariff is smaller than the increases in the value-added tax. It signals that the value-added tax is an inefficient way to raise tax revenue because it is not levied uniformly and the excess burden as a proportion of revenue generated exceeds import tariffs.[356] On the other hand, even though the lump-sum tax replacement reflects smaller decreases in welfare, which would point to how the lump-sum taxation is relatively more efficient, replacement of the value-added tax with the lump-sum tax

[354] In the value-added tax replacement with the U.S. price cut alone, the welfare rises by 0.05% but in the unilateral tariff liberalization case, under the same tax replacement, it reflects a welfare change of –0.50%. Thus, the difference in welfare is –0.55%, added by the tariff liberalization alone. In the lump-sum tax case, the U.S. price cut alone case yields a –0.01% welfare decline, but in the EU TL simulation run, welfare becomes –0.30% or –0.29% higher from tariff liberalization alone.
[355] For a similar story, see Konan and Maskus, 1997, p. 285.
[356] Rousslang, 1987, p. 89 further details the excess burden of taxes phenomenon.

hurts the economy as well. Thus, welfare falls for every adoption of the unilateral tariff liberalization alternatives being considered.

The most drastic decrease in welfare occurs with unilateral tariff liberalization with all of its trade partners in the value-added tax case. But, given that domestic prices of imports for consumption and investment are inclusive of the value-added tax, the domestic price of imports for consumption and investment rises by the largest extent in the full unilateral tariff liberalization case because the value-added tax increases by a larger amount than the tariff rates decreases, so the price rises, decreasing household consumption and thus depressing welfare. Allowing the distortionary value-added tax to replace the non-uniform import tariffs does not increase welfare, but sharply decreases it. Hence, the economy fares the worst in full unilateral tariff liberalization with value-added tax replacement.

The smallest welfare contractions occur when looking at the SACU TL case with value-added tax replacement. It is obvious, as previously stated, the decrease in the SACU TL case induces smaller changes in output given that it comprises, on average, 10.4% of total imports flowing into Mauritius in 1997. The domestic price of consumption and the domestic price of investment rise by the lowest amount because the smallest amount of import volume is being affected through the liberalization performed in the SACU TL case. Thus, the least amount of tariff revenue needs to be replaced by the value-added tax in this case, where the domestic price for consumption and investment not increasing by as much as in the other tariff liberalization cases, and therefore depressing welfare by less than all other cases.

Also, the welfare changes may be minute in general because of the updated tax policy data, which decreases the overall Sugar Milling sector's output volume. But, the minimal changes can also be attributed to the reciprocal trade access not being granted. This would

increase the flow of imports into the economy, exposing import-competing sectors such as the Other Agriculture, Sugar Milling, Other Manufacturing, and the Other Services sectors to foreign competition, depressing their overall output, but not allowing more access for the economy's exports (places to sell rather than the domestic market). Thus, the changes in welfare may not be large because of the tax policy adoption and that the reciprocal trade access is not accounted for (see Section 4.2.4.).

The real foreign exchange rate appreciates and depreciates depending on the tariff liberalization chosen and what tariff liberalization is employed. In the value-added tax replacement, the real foreign exchange rate changes by –0.84%, 0.21%, 0.04%, -3.95% in the tariff liberalization with the EU, SACU, U.S. and SACU, and with all of its trade constituents respectively. The appreciation of the currency occurs in the EU and the full tariff liberalization simulation runs. It depreciates in the SACU TL and U.S.-SACU TL cases. But, this directly follows from the European Union comprising an average share of 30.1% from 1969-2003. Thus, any removal of tariffs from this key importing sector will cause a significant amount of imports to be affected and hence the rupee to appreciate, as previously stated. The magnitude of the EU TL and the FUTL cases, in terms of the total imports liberalized, causes the rupee to appreciate because the sizable tariff liberalizations overtake the sugar export price effects, which cause the rupee to depreciate, under distortionary tax replacement. The depreciation in the SACU TL and U.S.-SACU TL cases stems from the fact that the tariff liberalization affects a small portion of the total imports of the economy at 10.4% and 14.0% of the total imports, on average, from 1969-2003, and do not exceed the depreciation produced by the decrease in the sugar export price by the United States. Hence, the real exchange rate increases and decreases in the value-added tax case.

However, the lump-sum tax replacement only produces a depreciation of currency. The real foreign exchange rate changes by 0.76%, 026%, 0.30%, and 1.02% across the various tariff liberalization cases. The sugar export price cut outweighs the tariff liberalization reduction of import prices, causing the rupee to depreciate. An increase in the real exchange is not strange given that it is sugar export price falls for a key export sector. Since the tariff changes will cause an appreciation of the rupee, the effects move in opposite directions. But, the canceling of the upward pressure on the rupee takes place with no other distortion favors one sector over another and the rupee becomes less expensive. Thus, the rupee depreciates in the lump-sum tax case. The real exchange rate changes differ from either the United States preferential price removal simulation set as well as the European Union preferential price removal with tariff liberalization, based on the changes in import volume and movements in the sugar exports. Overall, the real exchange rate is dependent on the tariff liberalization and tax replacement chosen, increases in six of eight cases and decreases in two of eight cases.

The value-added and lump-sum taxation increases for all tariff liberalization runs. In the value-added tax case and lump-sum tax case, the European Union and the full tariff liberalization reflect the largest increases of 33.91% and 112.63% in the value-added tax case and 1.1 and 3.9 billion rupees in the lump-sum taxation. In the EU FTA case, as previously stated, the region has an average of 30.1% of the total imports flowing into Mauritius from 1969-2003. Thus, with tariff liberalization, a substantial portion of the total imports is affected by tariff liberalization with a key importer. In the full tariff liberalization case, the value-added tax rate is scaled upward by the largest extent and the largest lump-sum transfer from consumers occurs because this is the maximum amount of tariff revenues to be replaced by the value-added tax or lump-sum taxation. Thus, the value-added tax revenue scaling and the lump-sum taxation increases

are largest in the full unilateral tariff liberalization and in the European Union tariff liberalization because they both impact all or a considerable amount of imports in the Mauritian economy.

The changes in taxes differ from the pure U.S. price cut case and only minimally so from the EU price cut. The value-added and lump-sum tax both have to increase whereas, in the United States preferential price removal simulation set the value-added tax rate is scaled downward and the lump-sum tax by much smaller amount (Table 19). And, it can obviously be argued that the removal of a key revenue generator in the Mauritian economy, the tariff revenue, causes the value-added or lump-sum tax to increase the more imported goods affected by the tariff liberalization. The EU sugar price removal with tariff liberalization tax changes have the value-added and lump-sum taxation amounts be only slightly smaller in all tariff liberalization cases for the value-added tax and the lump-sum tax replacements, except in the lump-sum taxation (see Table 29). However, they are similar in size, being at the most 0.99 percentage points apart for the value-added tax case (see Section 4.2.4.) and are always no more than 200 million rupees apart in the lump-sum tax case.[357] The difference can be explained by the reshuffling of output and imports occur such that the changes in revenue in the EU case with tariff liberalization could be slightly smaller than the adjustments in the in this case. All in all, the value-added tax is scaled downward and the lump-sum taxation increases for all tariff liberalization cases, regardless to the tax replacement.

Hence, tariff liberalization with the European Union, the Southern African Customs Union, the United States and the Southern African Customs Union, and with all of its trade partners decreases welfare the Mauritian economy for both the value-added tax and the lump-sum tax replacements, albeit a small amount. The welfare decreases by the maximum amount in

[357] Author's calculations.

the full unilateral tariff liberalization case with value-added tax replacements. But, the changes in welfare may not be large because of the tax policy adoption and that the reciprocal trade access is not explicitly modeled here. The real foreign exchange rate increases by a minute amount and decreases substantially in the value-added tax case. However, the foreign exchange rate only increases (the rupee depreciates) in the lump-sum tax case. Overall, the real exchange rate is dependent on the tariff liberalization and tax replacement chosen, both causing depreciations and appreciations of the rupee. Moreover, the value-added tax revenue scaling and lump-sum transfer is largest in the unilateral tariff liberalization and in the European Union tariff liberalization because they both entail impact a considerable amount of imports (30.1% and 100%). All in all, the value-added tax is scaled downward and the lump-sum taxation increases for all tariff liberalization cases, regardless to the tax replacement.

4.3.5 Economic Effects of the Mauritius Sugar Export Price Reduction by the United States and Tariff Liberalization on Labor and Capital Prices

The decrease in sugar export prices for sugar originating in Mauritius also affects the skilled and unskilled labor wage, in addition to the rental rate of capital. Table 35 exhibits the effects of the U.S. preferential price removal and the tariff liberalization measures Mauritius could adopt to decrease its welfare loss on factor prices for both the value-added and lump-sum tax replacement.

Table 35: Economic Effects of the United States Sugar Price Reduction and Tariff Liberalization on Factor Prices (Percentage Change from Updated Benchmark)[358]

Value-Added Tax Replacement

Sectors	A	B	C	D
Skilled Labor Wage (SLW)	-2.42	0.17	0.00	-5.66
Unskilled Labor Wage (ULW)	2.33	1.05	1.06	4.15
Rental Rate of Capital (ROC)	0.24	0.63	0.55	-0.31
SLW/ULW*	-4.64	-0.87	-1.05	-9.42
ROC/ULW**	-2.04	-0.42	-0.50	-4.28

A: U.S. sugar price cut and TL with EU, with value-added tax replacement
B: U.S. sugar price cut and TL with SACU, with value-added tax replacement
C: U.S. sugar price cut and TL with U.S.-SACU, with value-added tax replacement
D: U.S. sugar price cut and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors	A	B	C	D
Skilled Labor Wage (SLW)	-0.96	0.22	0.25	-1.02
Unskilled Labor Wage (ULW)	4.06	1.10	1.35	9.92
Rental Rate of Capital (ROC)	1.76	0.68	0.80	4.63
SLW/ULW*	-4.82	-0.87	-1.09	-9.95
ROC/ULW**	-2.21	-0.42	-0.54	-4.81

A: U.S. sugar price cut and TL with EU, with lump-sum tax replacement
B: U.S. sugar price cut and TL with SACU, with lump-sum tax replacement
C: U.S. sugar price cut and TL with U.S.-SACU, with lump-sum tax replacement
D: U.S. sugar price cut and full unilateral tariff liberalization, with lump-sum tax replacement

* SLW/ULW is defined as the percentage change in the relative factor prices or rather the percentage change in the skilled labor wage less the percentage change in the unskilled labor wage.
**ROC/ULW is defined as the percentage change in the relative factor prices or rather the percentage change in the rental rate of capital less the percentage change in the unskilled labor wage.

[358] Due to the normalization by the price of consumption, the levels are not comparable across runs. However, the sign of the price changes matters as well as the relative wage changes themselves, where the latter is comparable across simulation runs.

Several interesting characteristics of the U.S. sugar price reduction and tariff liberalization are presented in Table 35. The skilled labor wage change is dependent on the tariff liberalization that takes place. In the SACU TL and U.S.-SACU TL simulation runs, the skilled labor wage is non-negative for both the value-added and the lump-sum tax case. They are 0.17% and 0.00% respectively in the value-added tax replacement scenario and are 0.22% and 0.25% respectively in the lump-sum tax case. But, the output of the Export Processing Zone Manufacturing is the only sector with increasing output in any tariff liberalization scenario for the value-added and lump-sum tax replacement choices. It is the only sector with relevant absolute increases of 250, 94, 108, and 584 million rupees in the value-added tax case across the four tariff liberalization cases and it increases by 262, 95, 110, and 625 million rupees in the lump-sum tax case for the EU TL, SACU TL, U.S.-SACU TL, and the FUTL trade policy choices.[359] And, as previously shown, the EPZ sector's labor force is 24.24% skilled. However, the skilled labor wage increase is driven by the OSR sector's skilled labor wage contractions because it is 54.82% of the skilled labor demand in the updated benchmark and 70.89% of its total labor force is skilled. So, the Export Processing Zone Manufacturing sector's increases are in conjunction with the OSR sector not contracting its skilled labor demand but by –47 and –55 million rupees in the value-added tax case and by –46 and –53 million rupees in the lump-sum tax case for the SACU TL and the U.S.-SACU TL cases respectively. Therefore, the increase in the Export Processing Zone Manufacturing sector's output puts upward pressure on the skilled labor wage and smaller output contractions in the Other Services sector's skilled labor demand allows the skilled labor wage to increase in the SACU TL and the U.S.-SACU TL cases.

[359] The absolute changes in the skilled labor demand are the Author's calculations from the simulation results.

On the other hand, the skilled labor wage falls for the European Union and full unilateral tariff liberalization policy runs, again for both tax replacement choices. It decreases by –2.42% and –5.66% respectively with value-added tax replacement and by –0.96% and –1.02% respectively with the lump-sum tax replacement. It is true that the Export Processing Zone Manufacturing sector's output volumes increase by their largest extent here, which would place upward pressure on the skilled labor wage. But, in this case, the largest consumer of skilled labor, the Other Services sector suffers extreme skilled labor contractions from decreased output that are largest in the EU and the full unilateral tariff liberalization cases, which places downward pressure on the skilled labor wage. The output quantity declines in the EU TL and FUTL scenarios for the OSR sector by –205 and –430 million rupees respectively in the value-added tax case and –197 and –403 million rupees respectively in the lump-sum tax case.[360] Thus, the skilled labor wage increases for the SACU and U.S.-SACU tariff liberalizations and decreases for the EU TL and the FUTL cases.

The unskilled labor wage experiences an increase in wage across all simulation runs for each tax replacement. The percentage changes in the wage in the value-added tax case is 2.33%, 1.05%, 1.06%, and 4.15% for the EU TL, SACU TL, U.S.-SACU TL, and the FUTL simulation runs respectively, while increasing in the lump-sum tax case by 4.06%, 1.10%, 1.35%, and 9.92% respectively. The Export Processing Zone Manufacturing sector is the culprit in each case, because its output expands by the greatest extent when the European Union is involved in tariff liberalization, whether singularly or jointly. The reasoning is as follows. As previously mentioned, the European Union is the premiere importer into Mauritius, with 30.1% of the total imports, on average, from 1969-2003 and accounts for 25.0% of the EPZ sector's total imports.

[360] The absolute changes in skilled labor demand are the Author's calculations from the simulation results.

Thus, with the volume of imported input usage of the EPZ sector (i.e. being the second largest importer in the economy and having 45.3% of its total domestic supply being comprised of imports of goods and services), the key importer being affected by tariff liberalization measures will boost the EPZ sector's overall output. Then, as previously stated, the EPZ sector has a labor force that is predominately unskilled, where unskilled laborers comprise 76.76% of its labor force and the Export Processing Zone Manufacturing sector accounts for 40.20% of the total unskilled labor demand in the updated benchmark. The tariff liberalization favors a sector whose labor force is predominately unskilled (76.76%) and does so to the extent that regardless to the decreases in output volumes in other sectors that are predominately unskilled, the unskilled labor wage increases. Thus, the output increases in the Export Processing Zone Manufacturing sector increases the unskilled labor wage for all tariff liberalization scenarios.

Lastly, the rental rate of capital increases for all but one tariff liberalization case, the full unilateral tariff liberalization with value-added tax replacement case. The Export Processing Zone sector increases its output across the board and is a capital-intensive sector. In the value-added tax case and lump-sum tax case, the percentage increases are 0.24%, 0.63%, 0.55%, and –0.31% across the four tariff liberalization cases and increases by 1.76%, 0.68%, 0.80%, and 4.63% respectively. But, the numerous increases are logical given that the Export Processing Zone Manufacturing sector's output volumes increase for all tariff liberalization cases, but it is capital-intensive. The sector's capital employment expands by 1.0 billion, 408 million, 468 million, and 2.4 billion in the value-added tax case and 1.1 billion, 410 million, 478 million, and 2.6 billion in the lump-sum tax case for the Export Processing Zone Manufacturing sector for the four tariff liberalization choices.[361] The rental rate of capital is strictly increasing in the lump-

[361] The absolute changes in the capital employment are the Author's calculations.

sum tax replacement scenario because the high value-added tax levy holders that are capital-intensive, namely the Sugar Milling, Other Manufacturing, and the Electricity, Gas, and Water sectors are not as adversely affected by tariff liberalization because they do not face increases in their value-added tax rates. But, tariff liberalization causes output quantity contractions for every sector except the EPZ sector and it is more difficult for the EPZ sector's output increases to sustain the rental rate of capital differences in that it is not as a prominent consumer of capital as it is with unskilled labor (i.e. 40.20% of the total unskilled labor force versus 26.74% of the total capital employment in the updated benchmark).[362] Thus, the rental rate of capital increases for all tariff liberalization cases except the unilateral tariff liberalization case with value-added tax replacement.

The relative factor price changes yield the following assessments. First, the unskilled labor wage always fares better than the skilled labor wage. The percentage change in the relative wage measure, skilled labor wage percentage change divided by unskilled labor wage percentage change are –4.64%, -0.87%, -1.05%, and –9.42% in the value-added tax case for each tariff liberalization case and are –4.82%, -0.87%, -1.09%, and –9.95% respectively in the lump-sum tax case. The skilled labor wage always increases by less than the unskilled labor wage, particularly in the EU and full tariff liberalization cases. Also, the rental rate of capital percentage increases are always less than the unskilled labor wage percentage changes. The percentage change of the ratio of percentage changes of the rental rate of capital to the percentage changes of the unskilled labor wage are –2.04%, -0.42%, -0.50%, and –4.28% for the EU, SACU, U.S.-SACU, and the full unilateral tariff liberalization cases respectively in the value-added tax replacement scenario and are –2.21%, -0.42%, -0.54%, and –4.81% in the lump-

[362] The sectoral shares of unskilled laborers and capital are the Author's calculations from the simulation results.

sum tax case. Again, the unskilled laborer is best off in the EU and full unilateral tariff liberalization cases again. Thus, the unskilled labor wage is helped more by the tariff liberalization change than any other factor type in that its relative wage always increases by more than either the skilled labor wage or the rental rate of capital for all tariff liberalization cases.

In conclusion, the increase in the Export Processing Zone Manufacturing sector's output puts upward pressure on the skilled labor wage. The SACU TL and U.S.-SACU TL simulations are the runs in which the skilled labor wage increases for both the value-added tax and lump-sum tax scenarios. Furthermore, output volume increases in the Export Processing Zone Manufacturing sector's increases the unskilled labor wage as well. The output increases in the Export Processing Zone Manufacturing sector increases the unskilled labor wage for all tariff liberalization cases. On the other hand, the rental rate of capital increases for all tariff liberalization cases except the unilateral tariff liberalization case with value-added tax replacement, spawned by the EPZ sector's increase in output quantity as well. With the percentage change in the relative factor price percentage change, it is evident that the unskilled labor wage is helped more by the tariff liberalization change than any other factor type.

4.4 59% MAURITIUS SUGAR EXPORT PRICE REDUCTION BY THE EUROPEAN UNION AND A 45% MAURITIUS SUGAR EXPORT PRICE REDUCTION BY THE UNITED STATES WITH TARIFF LIBERALIZATION

The last set of simulations will present the effects of the joint removal of the preferential pricing for Mauritius' sugar exports by both the European Union and the United States with the adoption of tariff liberalization by Mauritius with European Union, the Southern African

Customs Union, the United States and the Southern African Customs Union, and with all of its trade partners. Section 4.4 will display the effects of the sugar price changes with tariff liberalization on the output volumes, export volumes, import volumes, welfare, the real foreign exchange rate, the value-added tax rate, the lump-sum tax, the real skilled labor wage, the real unskilled labor wage, and the real rental rate of capital.[363] Thus, the results of the joint preferential price removal coupled with the various tariff policy choices will be exhibited.

4.4.1 Economic Effects of the Mauritius Sugar Export Price Reductions by the European Union and the United States with Tariff Liberalization on Output Volumes by Sector

Mauritius will experience changes in output quantities by sector based on both the European Union and the United States removing the preferential prices that they pay for Mauritius' sugar exports coupled with tariff liberalization across the EU, SACU, U.S.-SACU, and with all of its trade partners. Thus, the output volume changes by sector are detailed in Table 36 for both the value-added tax and lump-sum tax replacement.

[363] All percentage changes are from the updated benchmark economy, or the updated benchmark, which is inclusive of the tariff changes that occur from 1997-2000 and the introduction of the value-added tax in 1998, with constant indirect taxes net of subsidies rates.

Table 36: Economic Effects of the Joint Sugar Price Reductions and Tariff Liberalization on Output by Sector (Percentage Change from Updated Benchmark)

Value-Added Tax Replacement

Sectors	A	B	C	D
Sugarcane	-66.81	-69.12	-69.21	-71.95
Other Agriculture	-6.18	-3.04	-3.61	-21.49
Sugar Milling	-63.70	-66.21	-66.30	-69.39
Export Processing Zone Manufacturing	13.44	8.73	9.17	23.17
Other Manufacturing	-5.41	-0.68	-1.25	-11.84
Electricity, Gas, and Water	-2.52	-0.65	-0.88	-6.28
Construction	-0.11	-0.04	-0.04	-0.21
Wholesale and Retail Trade and Repairs	-1.32	-1.17	-1.16	-1.49
Restaurants and Hotels	-7.97	-5.75	-6.48	-26.54
Transport, Storage, and Communication	-2.60	-2.92	-2.96	-5.23
Other Services	-4.76	-1.51	-1.65	-8.94

A: EU sugar price cut, U.S. sugar price cut, and TL with EU, with value-added tax replacement
B: EU sugar price cut, U.S. sugar price cut, and TL with SACU, with value-added tax replacement
C: EU sugar price cut, U.S. sugar price cut, and TL with U.S.-SACU, with value-added tax replacement
D: EU sugar price cut, U.S. sugar price cut, and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors	A	B	C	D
Sugarcane	-66.65	-69.12	-69.18	-71.51
Other Agriculture	-5.96	-3.03	-3.58	-20.93
Sugar Milling	-63.53	-66.20	-66.28	-68.91
Export Processing Zone Manufacturing	13.94	8.74	9.24	24.81
Other Manufacturing	-4.91	-0.66	-1.17	-10.32
Electricity, Gas, and Water	-1.29	-0.62	-0.68	-2.38
Construction	-0.11	-0.04	-0.04	-0.21
Wholesale and Retail Trade and Repairs	-2.50	-1.20	-1.35	-5.32
Restaurants and Hotels	-8.71	-5.77	-6.60	-28.62
Transport, Storage, and Communication	-3.50	-2.94	-3.10	-8.09
Other Services	-4.65	-1.51	-1.64	-8.59

A: EU sugar price cut, U.S. sugar price cut, and TL with EU, with lump-sum tax replacement
B: EU sugar price cut, U.S. sugar price cut, and TL with SACU, with lump-sum tax replacement
C: EU sugar price cut, U.S. sugar price cut, and TL with U.S.-SACU, with lump-sum tax replacement
D: EU sugar price cut, U.S. sugar price cut, and full unilateral tariff liberalization, with lump-sum tax replacement

Table 36 presents several interesting findings concerning the joint sugar export price change and tariff liberalization for the EU, SACU, U.S.-SACU, and for all trade partners. First, increases in output volumes only occur in the Export Processing Zone Manufacturing sector. There are significant percentage changes that range from 8.73% to 23.17% in the value-added tax replacement and are between [8.74%, 24.81%] in the lump-sum tax case. The equivalent absolute changes for the EU TL, SACU TL, U.S.-SACU TL, and the FUTL cases in the value-added tax replacement are 8.8, 5.7, 6.0, and 15.2 billion rupees respectively and are 9.2, 5.8, 6.1, and 16.3 billion rupees respectively in the lump-sum tax case.[364] As previously stated, the EPZ sector's output volumes can increase because of the depreciation of the rupee (it depreciates in all but three cases – see Table 39). However, the increases experienced here with tariff liberalization are larger than in the joint European Union and United States price cut case without tariff liberalization. But, this can be explained by the imported inputs in which the Export Processing Zone Manufacturing sector demands, being the second largest importer in the economy with a 34.40% share in total import quantity in the updated benchmark, and imports being 53.7% of its total domestic supply, which ultimately causes its production costs to fall as previously shown. And, the output change is larger than in the EU price cut with tariff liberalization as well as the U.S. price cut with tariff liberalization as well. The sugar export price change affects 99.11% of the total sugar exports, therefore, it is expected that the change would impact output quantities to a greater extent than the sugar price change in either the European Union or the United States alone. In essence, the EPZ sector experiences the only output volume increases, which are substantial in percentage and absolute terms, that are larger

[364] The absolute output volume changes are the Author's calculations from the simulation results.

than the EU-U.S. price cut case alone, EU price cut with tariff liberalization, and the U.S. price cut with tariff liberalization, because the EPZ sector is import dependent.

The largest increases in the output volume of the Export Processing Zone Manufacturing sector occur with the adoption of tariff liberalization with the European Union and with all of its trade partners. As before, the European Union is 25.0% of its total imports, by far the largest supplier of imports into the Export Processing Zone sector. Therefore, tariff liberalization for the European Union increases the overall output of the EPZ sector because of its heavy usage of imported inputs. The largest positive output quantity changes occur in the unilateral tariff liberalization case because all imports are liberalized, so the maximum amount of imported inputs become cheaper for the sector. Thus, the most sizable increases in output volume in the Export Processing Zone Manufacturing sector occurs in the unilateral tariff liberalization case, followed by the EU FTA case because of the sector's heavy imported input dependence.

The Export Processing Zone Manufacturing output changes are most reflective of the EU price change with tariff liberalization than the United States preferential price removal with tariff liberalization, although it is larger in magnitude than both cases. The differences in changes in this case can be explained from the dual price cut affecting a larger portion of the total sugar exports, thereby causing larger output changes than either the EU or U.S. price cuts with tariff liberalizations alone. But, this is logical given the EU price cut entails 95.34% of the total sugar exports and the EU-U.S. price cut encompasses 99.11% of the total sugar exports. All in all, the output volume changes EU-U.S. price cut with tariff liberalization are most similar to the EU price cut with tariff liberalization case.

Moreover, the largest percentage decreases in joint sugar price reduction and tariff liberalization occur in the Sugarcane, Sugar Milling, and Restaurants and Hotels sectors across

both tax replacement scenarios, with the Sugarcane and the Sugar Milling sector's having the largest decline. However, in absolute changes, the Sugarcane (for all cases), Sugar Milling (for all cases), Other Manufacturing (for the EU and the full unilateral tariff liberalization cases), and the Other Services (for the EU TL and the FUTL cases) sectors are the most substantial. The Sugarcane sector now suffers the largest percentage declines, with decreases as large as –71.95%, but no smaller than decreases of –63.53%. This translates into decreases of –1.1, -1.2, -1.2, and –1.2 billion rupees in the value-added tax case and –1.1, -1.2, -1.2, and –1.2 billion rupees in the lump-sum tax case for the four tariff liberalization scenarios respectively. Please note that the SUG sector has the largest declines in the SACU TL and the U.S.-SACU TL cases, the second largest declines in the EU TL case, and the third largest decreases in the FUTL case. And, as previously discussed, the Sugarcane sector suffers due to the Sugar Milling sector being its sole inter-industry customer and it further contracting under tariff liberalization because it is an import-competing sector. But, now the decreases are more pronounced than the –65.17% decline under the value-added tax replacement and –65.28% decrease under the lump-sum tax replacement (see Section 3.4.1.) from the European Union and the United States dual price cuts because its only customer's output is further depressed by tariff liberalization because it is an import-competing sector. The Sugarcane sector's output declines more than under the European Union preferential price removal with tariff liberalization simulation and the United States preferential price removal with tariff liberalization simulation. But, this directly follows from the Sugar Milling sector experiencing larger output volume declines due to 99.11% of its total export quantity incurring a price reduction. Thus, the Sugarcane sector suffers substantial output decreases that are larger than either the EU-U.S. preferential pricing removal in isolation, or the

EU or U.S. preferential pricing removal with tariff liberalization cases in isolation from the Sugar Millling sector deepened contractions.

The deepest contractions in the SUG sector occur in the full unilateral tariff liberalization case. However, each case is comparable. The unilateral tariff liberalization produces the largest change because the European Union and the Southern African Customs Union tariff liberalization occur jointly. The relevance of this is that the Sugar Milling sector, the only customer of the Sugarcane sector, is import-competing and the largest flow of liberalized sugar occurs in the full unilateral tariff liberalization case, depressing the Sugar Milling sector's sugar production by the greatest amount. The large declines occur with the Southern African Customs Union and the United States and the Southern African Customs Union tariff liberalizations, and to a lesser, but still significant extent, with the European Union tariff liberalization. This directly follows because the Southern African Customs Union is the single largest import region of origin for sugar, importing 89.5% of the total sugar imports into the Sugar Milling sector. On the other hand, the European Union imports the residual sugar exports into the Sugar Milling sector, comprising 10.5% of total Sugar Milling imports. Thus, when these regions liberalize, jointly or separately, the Sugar Milling sector's output is depressed by the largest extent, because the increase in imports hurts the Sugar Milling sector because of the increased competition on the domestic market. Thus, the decline in output in the Sugar Milling sector filters into the Sugarcane sector. Hence, the larger the declines in output volume experienced in the Sugar Milling sector, the larger the decreases in output volume for the Sugarcane sector will be, implying the most significant output decreases in the Sugarcane sector occurs in the full unilateral tariff liberalization, U.S.-SACU tariff liberalization, SACU tariff liberalization, and the EU tariff liberalization cases, in order of magnitude.

With the Sugar Milling sector, output volume decreases are also substantial. The output declines are no smaller than –63.53% and are as large as –69.39% across both tax replacement options. The absolute decreases are as follows: -897, -933, -934, and –978 million rupees across the four different tariff liberalization options in the value-added tax case and are –895, -933, -934, and –971 million rupees for the various tariff policy choices in the lump-sum tax case.[365] In terms of ordinal ranking, the Sugar Milling sector is the fourth largest decrease in the EU TL case, the second largest in the SACU TL and the U.S.-SACU TL case, and is the fifth largest decline in the FUTL case. Such stark decreases in output volume are expected given the Sugar Milling sector lost inflated prices for its sugar exports from the two most important regions to which it ships sugar, the European Union and the United States.

The output declines with tariff liberalization are much larger under the European Union and United States joint price cut alone because the output of the Sugar Milling sector also suffers from increased import flows, signifying it is import-competing. The EU-U.S. preferential price removal with tariff liberalization has larger decreases in the output volumes of the Sugar Milling sector than either the European Union price cut with tariff liberalization or the United States price cut with tariff liberalization case. The key reason is that 99.11% of sugar exports are affected by the sugar price cuts by the European Union and the United States. However, the results more closely track the European price cut with tariff liberalization, as expected, because the EU price cut affects 95.34% of the total sugar exports for the Sugar Milling sector. Thus, the output volume changes are substantial for the Sugar Milling sector, which directly affects the Sugarcane sector's output, and does so by a larger extent than the EU-U.S. price cut case alone, the EU price cut with tariff liberalization case, or the U.S. price cut with tariff liberalization case.

[365] The absolute output volume decreases are the Author's calculations from the simulation results.

As stated above in the Sugarcane output decrease, the largest decreases in output occur in the unilateral tariff liberalization cases. But, the magnitude of the changes are all still fairly close, with an ordinal ranking of the declines with the FUTL case first, the U.S.-SACU TL case second, the SACU TL case third, and the EU TL case last. The reason for the largest contractions being in the unilateral case is that SACU and the EU, in order of magnitude, comprise 89.5% and 10.5%, or rather 100.0% of the total imports into the Sugar Milling sector. The Sugar Milling sector is most adversely affected when tariff liberalizations occur with these two sectors, because, as stated before, its goods are import-competing. So, not only does the removal of protection of the Sugar Milling sector, of 10.00%, the highest levy rate in the economy, cause more imports to flow into the Sugar Milling sector itself when the tariffs are reduced to zero for the European Union or the Southern African Customs Union where with import increases, the increased level of imports puts downward pressure on the output volume of the Sugar Milling sector because of increased competition.

The Other Manufacturing sector suffers sizable decreases in output quantity in the European Union tariff liberalization case and in the full unilateral tariff liberalization case.[366] The Other Manufacturing sector's output volume declines by –5.41% and –11.84% for the EU TL and the unilateral tariff liberalization cases respectively in the value-added tax case and by –4.91% and –10.32% in the lump-sum tax replacement. These percentage changes produce a –1.1 and -2.3 billion rupees declines for both tariff liberalization cases in the value-added tax scenario and –963 million and –2.0 billion rupees in the lump-sum tax scenario across the EU TL and the

[366] The lowest decrease considered for the SACU TL is –933 million for the value-added and the lump-sum tax replacements. However, the OMA sector's output decline is only –132 million rupees in the value-added tax case and is –130 million rupees in the lump-sum tax case. So, those changes will not be addressed here. Likewise, the lowest decrease considered for the U.S.-SACU TL is –934 million rupees for the value-added and lump-sum tax replacements, while only being –246 and –229 million rupees for the value-added and lump-sum tax replacements respectively in the OMA sector. Hence, they will not be addressed either.

FUTL cases.[367] The ordinal ranking of its declines is third largest in the EU TL case and second largest in the unilateral tariff liberalization case. However, given that the Other Manufacturing sector is import-competing, increases in imports decrease its production. There are decreases for each tariff liberalization choice, unlike the increases in output that occur in the joint European Union and United States preferential price removal alone of 0.41% and 0.08% for the value-added and lump-sum tax replacement respectively (see Table 21). The main driver for the size of the decreases experienced here is the sector is import-competing and it loses its 7.60% tariff protection with tariff liberalization. The Other Manufacturing sector's output volume, when compared to the European Union price cut with tariff liberalization and the United States price cut with tariff liberalization, reflects the same position in size of output decreases (i.e. suffers the third largest decreases), but the increases are larger in magnitude. But, the EU-U.S. preferential price change with tariff liberalization is larger because the joint sugar export price reduction causes the output volumes to be perturbed to an even greater extent because almost all of its export quantity is being affected. All in all, the Other Manufacturing sector experience the largest decreases in output volume in the EU and unilateral tariff liberalization cases, incurring larger declines than in the pure EU-U.S. price cut case alone and larger decreases than in the EU price cut with tariff liberalization and the U.S. price cut with tariff liberalization counterparts.[368]

Lastly, the Other Services sector experiences sizable decreases in output volume with tariff liberalization with the European Union and unilateral tariff liberalization policy

[367] The absolute decreases in output quantity are the Author's calculations from the simulation results.

[368] The largest decreases in the OMA sector's output occurs in the unilateral tariff liberalization case and in the EU TL case secondarily. The maximum amount of imports is affected by full tariff liberalization and this causes the largest increase in foreign competition for this import-competing sector. Thus, output decreases by the largest amount when competition is at its peak. In the case of the EU, the region imports over 30% of the total imports into the Mauritian economy, the single largest import region in the economy, and would therefore affect a considerable portion of the imports flowing into the economy. Tariff liberalization with this sector also depresses output volumes in the OMA sector. Hence, the tariff liberalization cases that incur the largest changes are actually the two cases explicitly discussed.

implementations.[369] The EU TL and unilateral tariff liberalization causes percentage declines of –4.76% and –8.94% respectively in the value-added tax case and of –4.65% and –8.59% respectively in the lump-sum tax case, which equates to absolute decreases of –1.5 and –2.7 billion rupees in the value-added tax case and decreases of –1.4 and –2.6 billion rupees in the lump-sum tax case for the two liberalization scenarios accordingly.[370] Of course, as previously stated, the sector's output volume falls because 80.95% of its total inter-industry output occurs in sectors with output decreases. However, the Other Services sector is also an import-competing sector, and hence the magnitude of its output decreases is contingent on the amount of imports that are liberalized. It is a highly protected sector, with a 10.00% levy, or rather the highest tariff rate levied in the economy. When protection is removed, its output volume decreases. When compared to the EU-U.S. preferential price removal case without tariff liberalization, the decreases in output are more pronounced in this case because of the further output declines due to increased foreign competition. In the EU price cut case with tariff liberalization and the U.S. price cut case with tariff liberalization, the decreases of the Other Services sector are larger because all of the sugar exports are affected by the sugar export price cuts in this case. Thus, the OSR sector incurs large output quantity decreases in the EU TL and the full unilateral tariff liberalization cases because the OSR sector is highly protected and import-competing.[371]

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[369] In the SACU TL run the decrease in the OSR sector is –463 versus –933 million rupees in the value-added tax replacement case and in the lump-sum tax case it is –462 versus –933 million rupees. Thus, the SACU TL will not be discussed here. Also, the U.S.-SACU TL yields much smaller quantitative movements than the minimum decline considered. In the value-added tax case, the sector contracts by –508 million rupees and in the lump-sum tax case, the absolute contraction is –502 million rupees. But, this is compared to –934 million rupees across both tax replacement choices. So, the OSR sector's output expansions will only be discussed for the EU TL and the FUTL cases.

[370] The absolute changes are the Author's calculations from the simulation results.

[371] Please note that the largest decreases in the OSR sector actually occurs in the full unilateral tariff liberalization case and secondarily so, in the EU TL case. The largest declines occurring in the unilateral tariff liberalization case is concurrent with the maximum amount of foreign competition occurring, depressing the output of the import-competing sector. And, since the EU is the largest single importing region in the economy, the unilateral tariff

Therefore, the output volume for Export Processing Zone Manufacturing sector increases for all simulation runs, exceeding the pure EU-U.S. price cut case, as well as the singular EU price cut with tariff liberalization and the U.S. price cut with tariff liberalization cases due to its import dependence and a larger portion of sugar exports being affected by the sugar export price cut. The largest increases in output volume in the Export Processing Zone Manufacturing sector occurs in the unilateral tariff liberalization case, followed by the EU TL case because of the sector's heavy imported input dependence. On the other hand, the Sugarcane sector suffers substantial output decreases that are larger than the decreases that occur in either the EU-U.S. preferential pricing removal in isolation, or the in the EU or the U.S. preferential pricing removal with tariff liberalization cases separately from the Sugar Millling sector being import-competing and the sector having a larger portion of sugar exports affected by the price cut. Also, the larger the declines in output volume experienced in the Sugar Milling sector, the larger the decreases in output volume for the Sugarcane sector will be, implying the most significant output decreases in the Sugarcane sector occurs in the full unilateral tariff liberalization, U.S.-SACU tariff liberalization, SACU tariff liberalization, and the EU tariff liberalization, in order of magnitude. The removal of protection of the Sugar Milling sector cause more imports to flow into the Sugar Milling sector itself when the tariffs are reduced to zero for the European Union and/or the Southern African Customs Union because of the increased foreign competition they pose and thus decreases its output volume. These overall declines are largest in the EU-U.S. price cut with tariff liberalization case over the EU-U.S. price cut case from foreign competition increases in the import-competing Sugar Milling sector and by more than in the EU or U.S. price cut with tariff liberalization cases respectively because 99.11% of sugar is affected by the price cut now.

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liberalization with that region causes sizable decreases in the overall output of the Other Services sector because 70.6% of the imports are liberalized.

The Other Manufacturing sector experiences substantial declines in the tariff liberalization with the EU TL case and in the FUTL case because its is import-competing and highly protected. These decreases rather than increases in output occur when compared to the EU-U.S. price cut case alone because it is import-competing, so the gains in output are overtaken by the downward pressure from the foreign competition. But, the downward pressure on output volume from the EU-U.S. price cut with tariff liberalization simulation set is larger than either the EU price cut with tariff liberalization simulation set or the U.S. price cut with tariff liberalization simulation set because 99.11% of the total sugar exports experience price cuts. The OSR sector incurs large output quantity decreases in the EU TL and the full unilateral tariff liberalization cases because the OSR sector is highly protected and import-competing. In this case, larger negative effects occur than in the EU-U.S. price cut case alone because it is import-competing as well. Also, the size of the contractions exceed the EU and U.S. price cut with tariff liberalization cases in isolation because the amount of sugar export affected by the preferential price removal.

4.4.2 Economic Effects of the Mauritius Sugar Export Price Reductions by the European Union and the United States with Tariff Liberalization on Export Volumes by Sector

The joint sugar export price reduction by the European Union and the United States in conjunction with tariff liberalization for the European Union, the Southern African Customs Union, the United States and the Southern African Customs Union, and with all trade partners will affect export volumes. Therefore, this section will detail the movements in export quantities by sector. Table 37 presents the export volume changes for all tariff liberalization cases for the value-added and lump-sum tax replacement.

Table 37: Economic Effects of the Joint Sugar Price Reductions and Tariff Liberalization on Export Quantity by Sector (Percentage Change from Updated Benchmark)

Value-Added Tax Replacement

Sectors*	A	B	C	D
Other Agriculture	-9.55	-3.56	-4.38	-28.98
Sugar Milling	-95.34	-95.56	-95.58	-96.36
Export Processing Zone Manufacturing	13.69	8.81	9.26	23.86
Other Manufacturing	-5.78	0.01	-0.52	-11.54
Electricity, Gas, and Water	-1.24	-0.27	-0.37	-5.37
Wholesale and Retail Trade and Repairs	-4.20	-2.51	-2.75	-11.23
Restaurants and Hotels	-9.30	-6.59	-7.47	-31.20
Transport, Storage, and Communication	-3.49	-3.66	-3.82	-10.47
Other Services	-5.00	-2.34	-2.61	-13.07

A: EU sugar price cut, U.S. sugar price cut, and TL with EU, with value-added tax replacement
B: EU sugar price cut, U.S. sugar price cut, and TL with SACU, with value-added tax replacement
C: EU sugar price cut, U.S. sugar price cut, and TL with U.S.-SACU, with value-added tax replacement
D: EU sugar price cut, U.S. sugar price cut, and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors*	A	B	C	D
Other Agriculture	-9.32	-3.56	-4.34	-28.44
Sugar Milling	-95.32	-95.56	-95.58	-96.31
Export Processing Zone Manufacturing	14.18	8.83	9.34	25.50
Other Manufacturing	-5.26	0.03	-0.43	-9.94
Electricity, Gas, and Water	0.07	-0.26	-0.23	-1.24
Wholesale and Retail Trade and Repairs	-5.26	-2.54	-2.92	-14.44
Restaurants and Hotels	-9.97	-6.61	-7.58	-33.02
Transport, Storage, and Communication	-4.31	-3.68	-3.95	-12.97
Other Services	-4.80	2.34	-2.58	-12.45

A: EU sugar price cut, U.S. sugar price cut, and TL with EU, with lump-sum tax replacement
B: EU sugar price cut, U.S. sugar price cut, and TL with SACU, with lump-sum tax replacement
C: EU sugar price cut, U.S. sugar price cut, and TL with U.S.-SACU, with lump-sum tax replacement
D: EU sugar price cut, U.S. sugar price cut, and full unilateral tariff liberalization, with lump-sum tax replacement

*Only the sectors with positive export volumes are recorded in this table. Therefore, the Sugarcane and the Construction sectors are not included here. Also, the Electricity, Gas, and Water sector would not have any positive export volume had it not been assigned an amount through the application of the calculated supply shares to the exports of goods and services, a mechanism which is applied to usage values to ensure the share of production of a composite good is assigned to each producer of that good, because it is applied to final demand values as well.

There are several interesting attributes captured in Table 37. One is that the Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sectors are the only three sectors that undergo export quantity expansions. However, the EPZ sector changes are the only sizable changes that occur. The Export Processing Zone Manufacturing sector's export quantity exhibits a range of increase of [8.81%, 23.86%] for the value-added tax replacement and [8.83%, 25.50%] for the lump-sum tax replacement. The absolute changes for the EU TL, SACU TL, U.S.-SACU TL, and the FUTL cases in the value-added tax case are 8.1, 5.2, 5.5, and 14.1 billion rupees respectively and are 8.4, 5.2, 5.5, and 15.1 billion rupees respectively in the lump-sum tax case.[372] As before, the significant changes in the export volumes can be attributed to the output expansions experienced by the sector. The export quantity changes are larger in the EU-U.S. preferential price removal with tariff liberalization than in the joint price cut case alone. But, this is to be expected given the imported inputs of the EPZ sector become less expensive and it is the largest exporter in the Mauritian economy, accounting for 80.95% of the total export quantity in the updated benchmark, as well as 87.9% of its total domestic supply being exported, such that the increases in output translate into increases in exports as previously shown. Here, the output volume increases by a greater amount than the EU-U.S. price cut because tariff liberalization decreases production costs through cheaper imported inputs and hence boosts overall output volumes. Likewise, the increases in the export volume of the Export Processing Zone Manufacturing sector exceeds the EU and the U.S. price cut with tariff liberalization cases in isolation because 99.11% of the total sugar exports experience a price reduction. Therefore, the export quantity increases are the largest for the Export Processing Zone Manufacturing sector, which exceed the EU-U.S.

[372] The absolute export volume changes are the Author's calculations from the simulation results.

preferential price cut case, EU price cut case with tariff liberalization, and the U.S. price cut case with tariff liberalization because of its increased output from lower imported input costs and the total sugar exports being affected by the policy change.

Each simulation run that includes the European Union tariff liberalization causes the export quantity to rise by the largest amount, namely the EU and the full tariff liberalization cases with value-added and lump-sum tax replacement. But, as previously discussed, the European Union is 25.0% of the total imports flowing into the EPZ sector, the single most important region of import, and the EPZ sector's output increases from the EU tariff liberalization because of the sector's heavy usage of imported inputs from that region. However, 100% of its imported inputs become cheaper when all regions' tariff rates go to zero, decreasing the production costs of the EPZ sector thereby increasing its overall output by the largest amount, which then boosts its export quantity accordingly. Therefore, the Export Processing Zone Manufacturing sector's export volume rises by the greatest extent in the full tariff liberalization case followed by tariff liberalization with the European Union because of its import dependence.

On the other hand, the largest percentage contractions in the export quantity are in the Sugar Milling, Restaurants and Hotels, and the Other Agriculture sectors across both tax replacement options. With the assessment of absolute changes, the largest decreases belong to the Sugar Milling sector and are the most important export quantity decreases. The Sugar Milling sector contracts by as much as –96.36%, and with a minimum contraction of –95.32%. The absolute decreases are –688 million rupees for the EU TL case, -689 million rupees for the SACU TL case, -689 million rupees for the U.S.-SACU TL case, and –694 million rupees for the FUTL case with the value-added tax replacement. In the lump-sum tax case, the declines are –

687, -689, -689, and –694 million rupees for tariff liberalization with the European Union, the Southern African Customs Union, the United States and the Southern African Customs Union jointly, and with all of its trade partners respectively.[373] As previously shown, the Sugar Milling sector is the sector in which the price paid for its exports falls by 59% for the European Union and 45% for the United States, both of which paid an inflated price for the SMI sector's sugar exports. Thus, price reductions occur for 99.11% of the sector's total exports. However, this causes a substantial contraction in the overall export quantity because, as previously stated, the Sugar Milling sector exports a total of 97.72% of its total production in 1997 and 88.3% of its total domestic supply is comprised of exports of goods and services. The contractions in this case are larger than what are found in the European Union and United States joint preferential price removal, where the export quantity contracts by –94.94% and –94.95% for the value-added tax and the lump-sum tax replacement respectively (see Table 22). And, this directly follows in the output quantity contractions are naturally larger for the dual price cut case with tariff liberalization because the Sugar Milling sector's product, sugar, is import-competing.

Also, the Sugar Milling sector has the highest tariff rate of 10.00% available in the economy applied to it. Thus, with the removal of tariff barriers, more imports of sugar flow into the economy, and the sector's output is further decreased. With lower output volumes, export volumes fall as well. However, the EU-U.S. preferential price removal with tariff liberalization is also incurs larger negative movements than under the EU price cut with tariff liberalization or under the U.S. price cut with tariff liberalization because of the total sugar exports affected rising to 99.11%. All in all, the Sugar Milling sector is the only relevant sugar export quantity increase

[373] The absolute decreases are the Author's calculations from the simulation results.

with tariff liberalization, exceeding the percentage and absolute decreases in the EU-U.S. price cut case alone and in its EU and U.S. counterparts from the sector being import-competing.

The largest decreases in the Sugar Milling sector's exports occur in complete tariff liberalization with all of Mauritius' trade partners, but all cases decreases are fairly close. The largest decreases in export quantity occur, albeit very similar declines, in the full unilateral tariff liberalization case. The logic behind the substantial changes in this tariff liberalization case is the SACU is 89.5% of the Sugar Milling sector's imports and the European Union 10.5% of its imports. The SMI sector is import-competing, so when all of its imports are liberalized, the sector's output, and hence its export volume, is depressed to the greatest extent. Thus, when tariff liberalization occurs for the SACU and EU jointly in the FUTL case, the Sugar Milling sector contracts by the greatest extent because of the foreign competition as the sector is import-competing.

The aggregate export volumes increase for all tariff liberalizations in each tax replacement case. More specifically, in the value-added tax case, the aggregate export quantities increase by 9.16%, 5.73%, 6.02%, and 15.76% with the EU TL, SACU TL, U.S.-SACU TL, and the FUTL cases. And, in the lump-sum tax case, they increase by 9.54% in the EU TL case, 5.74% in the SACU TL case, 6.08% in the U.S.-SACU TL case, and by 17.04% in the FUTL case. Again, full tariff liberalization yields the highest increases in export volume. Each volume increase suggests that import tariffs are biased against exports in the Mauritian economy. Thus, the Lerner Symmetry theorem holds in the Mauritian economy.

In conclusion, the EPZ sector's export volume increases are more pronounced for the EU-U.S. preferential price removal with tariff liberalization than in the EU-U.S. price removal alone, but also exceeds the increases that occur for the European Union price cut with tariff

liberalization and the United States price cut with tariff liberalization cases because of output volume increases through lower production costs. This occurs because the EPZ sector is a key export sector and is favored by tariff liberalization because it is import dependent. But, the export quantity by sector declines most steeply in percentage and absolute terms, for the Sugar Milling sector, exceeding the pure EU-U.S. price cut case, EU price cut with tariff liberalization scenario, and the U.S. price cut case with tariff liberalization. This holds true because the Sugar Milling sector is import-competing, where increased imports decrease its overall production and hence its export volume. The sector's largest decreases occur in the full unilateral tariff liberalization case, although the decreases are quantitatively close across all tariff liberalization cases. Again, the Lerner Symmetry theorem is supported in that the export volumes increase with tariff liberalization.

4.4.3 Economic Effects of the Mauritius Sugar Export Price Reductions by the European Union and the United States with Tariff Liberalization on Import Volumes by Sector

The joint sugar export price reduction for Mauritius' sugar in conjunction with the various tariff liberalization cases induces changes in the import quantities by sector. Thus, Table 38 will display the changes in import quantities by sector for value-added and lump-sum tax replacements. It is as follows:

Table 38: Economic Effects of the Joint Sugar Price Reductions and Tariff Liberalization on Import Quantity by Sector (Percentage Change from Updated Benchmark)

Value-Added Tax Replacement

Sectors*	A	B	C	D
Other Agriculture	2.76	6.09	5.99	15.23
Sugar Milling	44.28	61.67	61.61	65.91
Export Processing Zone Manufacturing	11.48	7.44	7.79	20.20
Other Manufacturing	4.20	2.05	2.34	7.74
Restaurants and Hotels	-0.41	-1.03	-0.91	2.39
Transport, Storage, and Communication	-1.20	-1.75	-1.60	3.41
Other Services	16.94	0.55	0.66	25.70

A: EU sugar price cut, U.S. sugar price cut, and TL with EU, with value-added tax replacement
B: EU sugar price cut, U.S. sugar price cut, and TL with SACU, with value-added tax replacement
C: EU sugar price cut, U.S. sugar price cut, and TL with U.S.-SACU, with value-added tax replacement
D: EU sugar price cut, U.S. sugar price cut, and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors*	A	B	C	D
Other Agriculture	2.98	6.10	6.03	15.97
Sugar Milling	45.03	61.69	61.75	68.74
Export Processing Zone Manufacturing	12.05	7.46	7.88	22.09
Other Manufacturing	4.72	2.06	2.43	9.48
Restaurants and Hotels	-1.54	-1.05	-1.09	-1.39
Transport, Storage, and Communication	-2.23	-1.78	-1.77	-0.07
Other Services	16.93	0.55	0.66	25.70

A: EU sugar price cut, U.S. sugar price cut, and TL with EU, with lump-sum tax replacement
B: EU sugar price cut, U.S. sugar price cut, and TL with SACU, with lump-sum tax replacement
C: EU sugar price cut, U.S. sugar price cut, and TL with U.S.-SACU, with lump-sum tax replacement
D: EU sugar price cut, U.S. sugar price cut, and full unilateral tariff liberalization, with lump-sum tax replacement

*Only the sectors with positive import volumes are recorded in this table. Therefore, the Sugarcane, Electricity, Gas, and Water, Construction, and the Wholesale and Retail Trade and Repairs sectors are not included here.

The table shows how the import quantities changes are tariff liberalization dependent. First, the import quantities increase for the Other Agriculture, Sugar Milling, Export Processing Zone Manufacturing, Other Manufacturing, Restaurant and Hotels, Transport, Storage, and Communication, and the Other Services sectors. However, strict increases in import quantity only occur in the OAG, SMI, EPZ, and the OMA sectors only. Across the increasing sectors, the Export Processing Zone Manufacturing, Other Manufacturing, and the Other Services (for the EU TL and the FUTL cases only) sectors have the most significant increases in import quantity. The Export Processing Zone Manufacturing sector incurs the largest import quantity increases across all the sectors with positive import volumes. The sector's import quantity increases are 3.1, 2.0, 2.1, and 5.5 billion rupees for the EU TL, SACU TL, U.S.-SACU TL, and the FUTL cases respectively with value-added tax replacement and is 3.3, 2.0, 2.1, and 6.0 billion rupees respectively in the lump-sum tax case.[374] However, as previously shown, the EPZ sector is the second largest importer in the economy, accounting for 34.40% of the total import quantity in the updated benchmark. Thus, its import demand will increase as its output volume increases and indeed does so.

The pure EU-U.S. preferential price removal case does not incur the size of the changes that occur here based on the fact that the sector's output volumes rise because of cheaper imported inputs. The EPZ sector only has a 2.91% average tariff rate, but its removal still boosts the EPZ sector's imports. And, as previously given the loss of protection only increases the import quantity somewhat, while the output quantity changes are the key driver for import quantity changes. Also, as previously argued, the EU-U.S. preferential price cut with tariff liberalization are much larger than either of the price cut with tariff liberalization cases singularly

[374] The absolute import quantity changes are the Author's calculations from the simulation results.

due to 99.11% of the total sugar exports being affected by the dual preferential price removal. Therefore, the Export Processing Zone Manufacturing sector has it import quantities increase more than any other sector of increase, regardless to what tariff liberalization is implemented, outweighing the pure EU-U.S. price cut case and the EU and U.S. price cut with tariff liberalization cases separately because of import-dependence mainly, tariff removal to a smaller degree, and the magnitude of the total sugar exports affected by the preferential price removal.

The most prominent increases occur in the unilateral tariff liberalization case and then the European Union case, in order of magnitude. As previously argued, the unilateral tariff liberalization case allows the output quantities of the Export Processing Zone Manufacturing sector to expand by a substantial amount because all of its imported inputs become cheaper, reducing its production costs. And, with full tariff liberalization, the largest amount of goods and services are liberalized, and hence its output quantity rises, thereby raising its import volumes. In the EU TL, the Export Processing Zone Manufacturing sector fares well, increasing its import quantity by a significant amount because the EU is 25.0% of its total imports. The EPZ sector heavily relies on imported inputs, such that the more larger portion of its total imports that are liberalized, the better, where the EU is the key importer into the economy, and thus any tariff liberalization singular or joint with the EU produces significant changes in import quantities for the EPZ sector. All in all, the full unilateral tariff liberalization, and to a lesser, but still significant extent, the EU TL policy implementations cause the largest import quantity increases to occur in the Export Processing Zone Manufacturing sector because of its import dependence.

The Other Manufacturing sector is also a key sector for import increases. It has the second largest increases in all simulation runs. The absolute changes are 1.5 billion, 747 million, 852 million, and 2.8 billion rupees for the EU TL, SACU TL, U.S.-SACU TL, and the FUTL

cases in the value-added tax replacement. However, the changes are 1.7 billion, 750 million, 883 million, and 3.5 billion rupees across the four tariff liberalization choices in the lump-sum tax replacement.[375] The relevance here is that the Other Manufacturing sector is the largest import quantity sector in the economy under the updated benchmark, having an import quantity share of 46.42% as previously given. It too exceeds the import increases that the sector sees in the pure EU-U.S. price cut case that is no more than 1.12%, whereas in this case, it is [1.21%, 9.48%] across both tax replacements. The import tariff liberalization, where the OMA sector has a high average tariff rate of 7.60%, causes more goods to flow into the OMA sector. Thus, the Other Manufacturing sector's import volume increases are larger in magnitude than the pure EU-U.S. price cut scenario. Also, the Other Manufacturing sector import increases are larger in magnitude than either the EU or U.S. price cut with tariff liberalization cases alone. But, this is because 99.11% of the total sugar exports are included in the preferential price removal, whereas only 95.34% and 3.77% are involved in the EU price cut with tariff liberalization and the U.S. preferential price cut with tariff liberalization cases respectively. In essence, the Other Manufacturing sector's import quantities increase by a sizable amount, driven by its loss of protection, causing the sector to surpass the increases realized in the EU-U.S. price cut case alone, in the EU preferential price removal with tariff liberalization and the U.S. preferential price removal with tariff liberalization simulation sets.

Within the tariff liberalization cases, the most formidable increases in import quantity in the Other Manufacturing sector occur in the full unilateral tariff liberalization case and the European Union tariff liberalization case. In the former case, 100% tariff liberalization would remove its protection completely, allowing imports to flow in unrestricted by tariff barriers since

[375] The absolute import volume increases are the Author's calculations from the simulation results.

it is highly protected. And, with the EU TL, the import quantity increases because the EU is 39.6% of the sector's total import volume (see Table 7) and since the European Union comprises a significant portion of the OMA sector's imports, tariff liberalization with this region alone will greatly increase the overall import quantity flows. All in all, the full unilateral tariff liberalization, and then the European Union tariff liberalization increase the total import quantity for the Other Manufacturing sector by the largest extent.

However, the Other Services sector, the import quantity changes are the most significant in the EU TL and the FUTL cases.[376] The percentage and absolute changes for the value-added tax are 16.94% and 25.70% respectively, which translates into absolute changes of 816 million rupees and 1.2 billion rupees respectively. In the lump-sum tax case, the EU TL reflects a 16.93% change, or rather an 816 million rupees change in absolute terms and the full unilateral tariff liberalization case reflects a 25.70% or 1.2 billion rupees absolute change.[377] Import quantities fall for the Other Services sector in Section 3.4.3. in the EU-U.S. price cut case for the value-added and lump-sum tax replacement. But, with tariff liberalization, because the Other Services sector also has the highest implicit average tariff rate of 10.00% levied on it, imports increase by the greatest extent when all goods and services flowing into the sector are liberalized, or rather in the FUTL case. A sharp import quantity increase occurs when the European Union is involved, given that it comprises 70.6% of the total OSR sector's imports alone. The changes are very similar to the European Union price cut with tariff liberalization and move in the same pattern as in the United States price cut with tariff liberalization case, although slightly smaller

[376] The SACU TL and the U.S.-SACU TL cases are not discussed for the Other Manufacturing sector because the increases are a small portion of the total import quantity by each simulation run. The SACU TL with value-added tax and lump-sum tax replacement is only 0.03% of the total import volume. And, in the OSR sector, the U.S.-SACU TL case is only 0.04% of the total import volume in the value-added and lump-sum tax replacements respectively. Thus, neither is addressed.

[377] The absolute import quantity changes are the Author's calculations from the simulation results.

increases do occur in the EU-U.S. price cut case in reference to both cases. Hence, the Other Services sector experiences significant import quantity increases in the European Union and the full unilateral tariff liberalization cases, expanding rather than contracting as in the pure EU-U.S. case, reflective of the changes in the EU price cut with tariff liberalization case, but has slightly smaller increases than in the U.S. price cut case with tariff liberalization case.

Furthermore, decreases in import quantity take place in the Restaurants and Hotels and the Transport, Storage, and Communication sectors. The RAH sector's absolute declines are smaller than the decreases in the TSC sector. The absolute declines in import quantity for the EU TL, SACU TL, U.S.-SACU TL, and the FUTL cases are –8, -20, -17, and 46 million rupees respectively in the value-added tax case and are –30, -20, -21, and –27 million rupees respectively in the lump-sum tax case. However, the Transport, Storage, and Communications sector has import decreases and an increase of –58, -85, -77, and 164 million rupees across the four tariff liberalization cases with value-added tax replacement and –107 –86, -85, and –3 million rupees in the lump-sum tax case.[378] The largest declines occur in the Transport, Storage, and Communications sector. It is the sector that experiences the largest import quantity decreases in this simulation set, but are only a 1.0% of the total import quantity volume at the most, so the RAH and TSC sectors will not be further discussed.

Aggregate import volumes do indeed increase for all tariff liberalization cases, regardless to the tax replacement. The aggregate import quantities increase by 7.26% in the EU TL case, 4.07% in the SACU TL case, 4.34% in the U.S.-SACU TL case, and by 13.41% in the FUTL case with value-added tax replacement. Also, in the lump-sum tax case, the aggregate import quantities increase across the tariff liberalization scenarios by 7.62%, 4.07%, 4.39%, and 14.61%

[378] The absolute import quantity changes are the Author's calculations from the simulation results.

respectively. And, as previously displayed, the aggregate import volume increases by the largest amount in the full unilateral tariff liberalization case. Thus, removal of protection affords import quantity increases in the economy.

Thus, the import quantities for the Export Processing Zone Manufacturing, Other Manufacturing, and the Other Services sectors have the most substantial absolute increases, where they are usually larger in magnitude (except the OSR sector joint price change with tariff liberalization is smaller than the U.S. price cut with tariff liberalization) than the EU-U.S. price cut case alone or the European Union price cut with tariff liberalization and the United States preferential price removal with tariff liberalization separately due to import dependence for the EPZ sector and minutely so, for loss of protection, whereas the loss of protection for the OMA and the OSR sectors is the primary reason for the import quantity increases in these sectors. Import volumes increase most sharply in the full unilateral and the European Union tariff liberalization cases for each sector. On the other hand, the Transport, Storage, and Communications sector experiences the largest declines in import quantity, but the import quantity changes in the sector are negligible. Lastly, the import volumes increase for all tariff liberalization scenarios.

4.4.4 Economic Effects of the Mauritius Sugar Export Price Reductions by the European Union and the United States with Tariff Liberalization on Welfare, Foreign Exchange, and the Replacement Taxes

There are consequences to the change in sugar export price for exports received from Mauritius for the European Union and the United States coupled with the unilateral tariff liberalization for the European Union, the Southern African Customs Union, the United States,

the United States and the Southern African Customs Union, and with all of its trade constituents. These changes will impact the welfare, real foreign exchange rate, the value-added tax rates, and the lump-sum tax. Thus, Table 39 will outline the various movements in the welfare, foreign exchange rate, the value-added tax rate, and the lump-sum tax for both the value-added tax replacement and lump-sum tax replacement.

Table 39: Economic Effects of the Joint Sugar Price Reductions and Tariff Liberalization on Welfare, Foreign Exchange, Value-Added Tax Rate, and Lump-Sum Taxation (Percentage Change from Updated Benchmark Except Lump-Sum Tax)

Value-Added Tax Replacement

Sectors	A	B	C	D
Welfare	-0.72	-0.41	-0.47	-0.81
Foreign Exchange Rate (e)*	-0.98	0.07	-0.11	-4.10
Value-Added Tax Rate	33.65	0.81	5.37	113.68
Lump-Sum Tax (Billions of Rupees)	-	-	-	-

A: EU sugar price cut, U.S. sugar price cut, and TL with EU, with value-added tax replacement
B: EU sugar price cut, U.S. sugar price cut, and TL with SACU, with value-added tax replacement
C: EU sugar price cut, U.S. sugar price cut, and TL with U.S.-SACU, with value-added tax replacement
D: EU sugar price cut, U.S. sugar price cut, and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors	A	B	C	D
Welfare	-0.61	-0.41	-0.45	-0.49
Foreign Exchange Rate (e)*	0.56	0.11	0.15	0.90
Value-Added Tax Rate	-	-	-	-
Lump-Sum Tax (Billions of Rupees)	1.17	0.03	0.19	3.90

A: EU sugar price cut, U.S. sugar price cut, and TL with EU, with lump-sum tax replacement
B: EU sugar price cut, U.S. sugar price cut, and TL with SACU, with lump-sum tax replacement
C: EU sugar price cut, U.S. sugar price cut, and TL with U.S.-SACU, with lump-sum tax replacement
D: EU sugar price cut, U.S. sugar price cut, and full unilateral tariff liberalization, with lump-sum tax replacement

*e is defined as Rupees per Foreign Currency.

The table displays several key effects from the dual price cuts and the various tariff liberalization scenarios that are implemented. First, the welfare effects are negative for tariff liberalization with the European Union, the Southern African Customs Union, the United States and the Southern African Customs Union jointly, and with all of its trade partners for the value-added and lump-sum tax replacement. With value-added tax replacement, the welfare falls by –0.72%, -0.41%, -0.47%, and –0.81% respectively for the aforementioned tariff liberalization cases. In the lump-sum tax replacement, welfare decreases by –0.61%, -0.41%, -0.45%, and –0.49% respectively. Instead of the negative terms of trade effects from the sugar export price reduction being counteracted by the price removal, it is exacerbated by every tariff liberalization policy that is implemented. In the value-added tax case, the welfare falls additionally by as much as –0.78% from tariff liberalization alone. In the lump-sum tax case, although smaller declines in welfare occur, it still by up to –0.29%.[379]

The steeper welfare declines are largely due to several import-competing sectors now becoming further exposed to foreign competition via import tariff liberalization. For each liberalization case, sectors such as the Other Agriculture, Sugar Milling, Other Manufacturing, and the Other Services sectors, suffer substantial decreases in their output volume, turning from increasing to contracting output volume sectors or are contracting by an even larger extent, signifying that they are import-competing. Thus, the decreases in welfare grow with tariff liberalization because of the total effect on the import-competing sectors, and are deeper than the pure EU-U.S. case because of that factor. Furthermore, the welfare losses are greater than in the

[379] The welfare changes are based on the quantitative changes from the EU-U.S. preferential price cut alone and the EU-U.S. price cut with tariff liberalization. In the former, the unilateral tariff liberalization produces the largest decrease in welfare at –0.81% for this simulation run, but is only –0.03% for the pure EU-U.S. price cut. This is the method used to calculate the additional welfare decline of –0.78% reported above. The same method is used in the lump-sum tax case, where the EU FTA scenario produces a –0.61% welfare reduction, which is actually –0.28% above the –0.32% decline in Table 24.

EU price cut case with tariff liberalization or the U.S. price cut case with tariff liberalization because the 99.11% of the total sugar exports lose their preferential pricing in this case. Therefore, the welfare declines for all tariff liberalization cases, and incurs much larger decreases than exhibited in the pure EU-U.S. preferential price removal case or the EU and U.S. counterparts with tariff liberalization, because of the negative effects on import-competing sectors.

The largest welfare declines are tax replacement dependent. The decreases in welfare are most pronounced in the full unilateral tariff liberalization case followed by the European Union tariff liberalization case in the value-added tax case, whereas in the lump-sum tax case, it occurs in the EU TL, followed by the FUTL case. In the former tax case, steep welfare declines occur where the value-added tax rates have to be scaled by 33.65% and by 113.68% to replace the tariff revenue. These value-added tax levies are applied to consumption and would thus decrease the consumer's buying power, and hence overall welfare of the economy, by definition. Simply put, the more tariff liberalization that is implemented, the further depressed the welfare becomes because the distortionary value-added tax replacement is an inefficient tax to replace tariff revenues. Thus, when full unilateral tariff liberalization liberalizes 100.0% of the total import quantity and tariff liberalization with the European Union causes the liberalization of 30.1% of the total imports, on average, welfare declines by the greatest extent. In the lump-sum tax case, the non-distortionary replacement flips these trade scenarios in terms of magnitude of losses. With no distortion, the import-competing sectors are most adversely affected in the EU TL than in the FUTL case. But, with full unilateral tariff liberalization, given that the import-competing sectors do import goods and services as well, the lower imported input cost raises the overall welfare to a smaller negative. Hence, the value-added tax has the largest decreases in welfare in

the unilateral tariff liberalization case first and then in the EU TL and in the lump-sum tax case, they are in reverse order of magnitude, with the largest welfare decline still occurring in the unilateral tariff liberalization case with value-added tax replacement.

Welfare decreases may not be as large as suspected for two reasons. The key reason still stems from the decreases in output and export quantity in the Sugar Milling sector through domestic tax policy changes. However, the welfare changes can also be small because reciprocal trade is not considered in this study, the increased access to foreign markets because of Mauritius' tariff liberalization. Thus, the welfare effects may be understated here.

In the foreign exchange variable, there is both appreciation and depreciation of the rupee. In the value-added tax, the rupee appreciates in the EU TL case by –0.98%, the U.S.-SACU TL case by –0.11%, and in the FUTL case by –4.10%, while depreciating in the SACU TL case. But, this is not strange given that the more tariff liberalization occurs, the larger the appreciation of the rupee. Hence, with 30.1%, 14.0%, and 100% of the total imports being liberalized, the appreciation occurs, making the domestic goods more expensive relative to the foreign goods. The import tariff liberalization effects simply outweigh the negative terms of trade effects in these cases, which could cause the rupee to depreciate. However, the SACU TL case produces a depreciation of the rupee that is essentially zero, where the negative terms of trade effects and the tariff liberalization effects are almost equal. But, in the lump-sum tax case, the foreign exchange rate only depreciates. The rupee depreciates by 0.56%, 0.11%, 0.15%, and 0.90% for tariff liberalization with the European Union, the Southern African Customs Union, the United States and the Southern African Customs Union, and with all of its trade constituents respectively. With no increases in the value-added tax occurring and only the lump-sum taxation being increased, the negative terms of trade effects always dominate the import tariff

liberalization effects, causing a decline in the rupee relative to foreign currency. The largest depreciation occurs with full unilateral tariff liberalization, and the second largest, in the EU tariff liberalization. The SACU TL and U.S.-SACU TL cases are almost equal, essentially being zero, due to fairly equal, yet the opposite movements of the export price reduction and the import tariff liberalization effects on the rupee. The EU-U.S. preferential price case alone exhibits a depreciation of the rupee in the value-added tax case and an appreciation of the rupee in the lump-sum tax case (see Table 24). But, the EU-U.S. price removal with tariff liberalization closely tracks the EU price removal with tariff liberalization. However, this is logical given the EU price cut covers 95.34% of the total exports in the Sugar Milling sector. All in all, the real exchange rate rises and falls, which denotes a depreciation and an appreciation of the rupee respectively, depending on the tariff liberalization policy and tax replacement chosen.

Lastly, the value-added tax and the lump-sum tax are required to increase to maintain the government revenues. The value-added tax rates are scaled upward by 33.65%, 0.81%, 5.37%, and by 113.68% for the EU TL, SACU TL, U.S.-SACU TL, and the FUTL cases respectively. In the lump-sum tax case, the transfers from the consumer to the government increase by 1.2, 0.03, 0.19, and 3.90 billion rupees respectively. But, the changes hold given that the EU comprises 34.2% of the total imports in 1997, SACU comprises 10.8%, the U.S. and SACU combined comprise 14.1%, and the full unilateral tariff liberalization would cover the total import quantity. With the loss of the largest revenue generating tax being the greatest for those with the largest import shares, the tax revenue has to increase in all cases, with the lowest increase in the SACU TL case, followed by the U.S.-SACU TL case, and then the EU TL case, and the largest being in the FUTL case. All in all, the value-added tax rates must be scaled

upward and the lump-sum taxation transfer from the consumer to the government must increase to maintain government revenues with tariff liberalization.

In conclusion, welfare decreases for all tariff liberalization cases and for each tax replacement choice. The largest declines are in the full unilateral tariff liberalization and the European Union tariff liberalization cases in the value-added tax replacement, and, are in reverse order of magnitude in the lump-sum tax replacement, with the largest decline still occurring in the unilateral tariff liberalization case with the value-added tax replacement. The real foreign exchange rate both increases and decreases, with the largest and most significant increases or rather depreciations of the rupee occurring in the European Union and the full unilateral tariff liberalization cases in the lump-sum tax case and the most significant decreases or appreciations in the rupee occurring in the EU TL and the FUTL cases in the value-added tax case. Lastly, the value-added tax rates percentage changes and the lump-sum tax transfers from the consumer to the government are always positive and are quite substantial in the EU TL and the FUTL cases.

4.4.5 Economic Effects of the Mauritius Sugar Export Price Reductions by the European Union and the United States with Tariff Liberalization on Labor and Capital Prices

The change in sugar export price by the European Union and the United States coupled with the tariff liberalization for the European Union, the Southern African Customs Union, the United States, the United States and the Southern African Customs Union jointly, and with all of its trade constituents affects the skilled labor wage, unskilled labor wage, and the rental rate of capital. Thus, Table 40 will display the various movements in the factor prices for the value-added tax replacement and lump-sum tax replacement.

Table 40: Economic Effects of the Joint Sugar Price Reductions and Tariff Liberalization on Factor Prices (Percentage Change from Updated Benchmark)[380]

Value-Added Tax Replacement

Sectors	A	B	C	D
Skilled Labor Wage (SLW)	-2.35	0.24	0.06	-5.68
Unskilled Labor Wage (ULW)	1.77	0.48	0.50	3.69
Rental Rate of Capital (ROC)	0.27	0.67	0.58	-0.34
SLW/ULW*	-4.05	-0.24	-0.44	-9.04
ROC/ULW**	-1.47	0.19	0.08	-3.89

A: EU sugar price cut, U.S. sugar price cut, and TL with EU, with value-added tax replacement
B: EU sugar price cut, U.S. sugar price cut, and TL with SACU, with value-added tax replacement
C: EU sugar price cut, U.S. sugar price cut, and TL with U.S.-SACU, with value-added tax replacement
D: EU sugar price cut, U.S. sugar price cut, and full unilateral tariff liberalization, with value-added tax replacement

Lump-Sum Tax Replacement

Sectors	A	B	C	D
Skilled Labor Wage (SLW)	-0.90	0.28	0.30	-1.00
Unskilled Labor Wage (ULW)	3.47	0.52	0.77	9.49
Rental Rate of Capital (ROC)	1.78	0.70	0.82	4.64
SLW/ULW*	-4.22	-0.24	-0.47	-9.58
ROC/ULW**	-1.63	0.18	0.05	-4.43

A: EU sugar price cut, U.S. sugar price cut, and TL with EU, with lump-sum tax replacement
B: EU sugar price cut, U.S. sugar price cut, and TL with SACU, with lump-sum tax replacement
C: EU sugar price cut, U.S. sugar price cut, and TL with U.S.-SACU, with lump-sum tax replacement
D: EU sugar price cut, U.S. sugar price cut, and full unilateral tariff liberalization, with lump-sum tax replacement

* SLW/ULW is defined as the percentage change in the relative factor prices or rather the percentage change in the skilled labor wage less the percentage change in the unskilled labor wage.
**ROC/ULW is defined as the percentage change in the relative factor prices or rather the percentage change in the rental rate of capital less the percentage change in the unskilled labor wage.

[380] Due to the normalization by the price of consumption, the levels are not comparable across runs. However, the sign of the price changes matters as well as the relative wage changes themselves, where the latter is comparable across simulation runs.

This table underscores several interesting attributes of the Mauritian economy. On the one hand, the skilled labor wage percentage increases and decreases are both tariff liberalization and tax replacement dependent. In the value-added tax case, the skilled labor wage increases in the SACU tariff liberalization and the U.S.-SACU tariff liberalization by 0.24% and 0.06%, and in the lump-sum tax case by 0.28% and 0.30% for the SACU and U.S. tariff liberalizations respectively. The skilled labor wage increases driven by the Export Processing Zone Manufacturing sector increases in output. The Export Processing Zone Manufacturing sector's output expands by the largest amount and is the only expanding sector in the economy with tariff liberalization. As previously discussed, it is the second largest absorber of labor in the economy and even though it has a workforce that is 76.76% unskilled, it does demand some skilled labor (24.24%). Therefore, because of the EPZ sector's substantial labor force base, where it demands 17.51% of the total skilled labor in the updated economy, increases in its output puts upward pressure on the skilled labor wage.[381] For the SACU TL case, its demands 231 million rupees of additional labor and in the U.S.-SACU TL case, it demands 243 million rupees additional skilled labor in the value-added tax scenario and 231 and 245 million rupees respectively of additional skilled labor in the lump-sum tax scenario.

This is while the OSR sector decreases its skilled labor demand by –98 million and –105 million rupees for the SACU TL and the U.S.-SACU TL with value-added tax replacement and by –97 and –104 million rupees across both tariff policy choices respectively in the lump-sum tax case.[382] The relevance of stating the absolute changes is that the OSR sector is indeed a relevant sector concerning the skilled labor wage since skilled labor accounts for 70.89% of its

[381] The sectoral share of skilled labor demand is the Author's calculations from the updated benchmark as given through the simulation results.
[382] The absolute skilled labor demand changes are the Author's calculations from the simulation results.

total labor force and is 54.82% of the total skilled labor force demand in the updated benchmark as previously shown. Therefore, the increases in the output volume of the EPZ sector cause the skilled labor wage to rise in the SACU TL and U.S.-SACU TL cases.

On the other hand, the skilled labor wage decreases in the European Union and the full unilateral tariff liberalization cases by –2.35% and –5.68% in the value-added tax case and by –0.90% and –1.00% in the lump-sum tax case. In the EU TL and FUTL cases, the EPZ sector's output volume increase is the only pressure for the skilled labor wage to increase and its skilled labor demand rises by 383 and 679 million rupees respectively in the value-added tax case and by 396 and 722 million rupees respectively in the lump-sum tax case. But, the Other Services sector, a sector that is labor-intensive and has a labor force that is predominately skilled, contracts. The decreases in the OSR sector's output causes a –255 and a –466 million rupees decrease in its skilled labor consumption for the EU TL and the FUTL cases respectively for the value-added tax replacement and causes a –246 and a –438 million rupees decrease across both tariff liberalization cases in the lump-sum tax replacement.[383] These decreases in the OSR sector are sufficient enough with the other decreases in the economy to decrease the overall wage, outstripping the wage's upward pressure as exerted by the EPZ sector.

The unskilled labor wage increases for every tariff liberalization choice implemented and every tax replacement applied. In the value-added tax case, it rises by 1.77%, 0.48%, 0.50%, and 3.69% for tariff liberalization with the EU, SACU, U.S.-SACU, and with all of its trade partners, and increases by 3.47%, 0.52%, 0.77%, and 9.49% respectively in the lump-sum tax case. In this case, only the EPZ sector's output increases. But, the EPZ sector, it has a labor force that is

[383] The absolute changes in the skilled labor demand is the Author's calculations from the simulation results.

76.76% unskilled, despite being slightly more capital- than labor-intensive.[384] Hence, the larger output increases due to it being imported input dependent causes a considerable increase in its unskilled labor demand, with absolute increases of 1.0 billion, 706 million, 736 million, and 1.6 billion rupees in the value-added tax replacement for tariff liberalization with the EU, SACU, U.S. and SACU jointly, and with all of its trade partners. The increases for the unskilled labor demand is similar to what is found in the value-added tax case, with 1.0 billion, 707 million, 741 million, and 1.7 billion rupees increases across the various tariff liberalization scenarios in the lump-sump tax case.[385] Hence, tariff liberalization favors unskilled workers, solely through the EPZ sector's output expansions.

Furthermore, the rental rate of capital increases and decreases across the various tariff liberalization cases. The factor experiences percentage changes that range from [-0.34%, 0.67%] in the value-added tax case and [0.70%, 4.64%] in the lump-sum tax case. Every single increase is driven by the increases in the additional sectoral capital deployment through the EPZ sector. In the value-added tax case, the capital employment increases by 1.6 billion, 973 million, 1.0 billion, and 2.8 billion rupees across the four tariff liberalization cases respectively and by 1.6 billion, 974 million, 1.0 billion, and 3.0 billion rupees in the EU TL, SACU TL, U.S.-SACU TL, and the FUTL cases respectively.[386] The decrease in the unilateral tariff liberalization case with value-added tax replacement is again due to the increases in the EPZ sector exerting enough upward pressure on the rental rate of capital because of the Sugar Milling, Other Manufacturing, and Electricity, Gas, and Water being most adversely affected by the sizable value-added tax increase with full tariff liberalization because each have the highest value-added tax levy of

[384] The sector's capital- to labor-intensity is 16.8% versus 16.4%, as calculated in Table 5.
[385] The absolute unskilled labor demand is the Author's calculations from the simulation results.
[386] The absolute changes in capital demand are the Author's calculations from the simulation results.

10.00%. Thus, the rental rate of capital increases are driven solely by the increases in output quantity in the EPZ sector, falling only in the full tariff liberalization with value-added tax replacement.

The ratio of factor price changes supports how unskilled labor is usually better off than any other factor with tariff liberalization than without it. The percentage changes in the ratio of the percentage change in the skilled labor wage to the percentage change in the unskilled labor wage are –4.05%, -0.24%, -0.44%, and –9.04% in the value-added tax case and are –4.22%, -0.24%, -0.47%, and –9.58% for the tariff liberalization with the EU, SACU, U.S. and SACU, and with all of its trade partners respectively. In each instance, the unskilled labor wage rises relative to the skilled labor wage. Thus, the unskilled laborer always fares better than the skilled laborer. The percentage change in the ratios of the rental rate of capital percentage changes to the unskilled labor wage percentage changes are –1.47%, 0.19%, 0.08%, and -3.89% for the value-added tax replacement case and –1.63%, 0.18%, 0.55%, and –4.43% in the lump-sum tax case for the EU TL, SACU TL, U.S.-SACU TL, and the FUTL scenarios respectively. For the SACU TL and the U.S.-SACU TL cases, the rental rate of capital increases by more than the unskilled labor wage. Only in the EU TL and the FUTL cases are the unskilled labor wage percentage changes greater. The cementing factor is that the Export Processing Zone Manufacturing sector is 40.20% of the updated benchmark's total unskilled labor supply, but is only 26.74% of the total capital inputs in the updated benchmark. Thus, the output changes in the sector more readily help/hurt the unskilled labor than the capital inputs. Therefore, the unskilled laborer always does better than the skilled laborer, but only does better than the capitalist in the European Union tariff liberalization and the full unilateral tariff liberalization cases.

In conclusion, the increases in the output volume of the EPZ sector causes the skilled labor to rise in the SACU and U.S.-SACU tariff liberalization cases, but the larger decreases in the output volumes of the OSR sector are significant enough to cause the skilled labor wage to fall in the EU and the unilateral tariff liberalization case. Overall, tariff liberalization favors unskilled workers, solely through the EPZ sector's output expansions, where its wage increases for all tariff liberalization cases. Moreover, the rental rate of capital increases for all but the unilateral tariff liberalization with value-added tax replacement, again from the EPZ sector's output volume increase. It falls because the capital-intensive sectors in the unilateral tariff liberalization with value-added tax replacement suffer the largest output declines and their falling capital demand causes the rental rate of capital to fall despite the increases in the EPZ sector's capital demand. Lastly, the ratios of the percentage changes in the factor prices reflects that the unskilled laborer always does better than the skilled laborer, but only does better than the capitalist in the European Union tariff liberalization and the unilateral tariff liberalization cases.

4.5 CONCLUSIONS

The preferential pricing removal for the Sugar Milling sector's exports by the European Union and the United States in isolation and jointly, when coupled with the implementation of unilateral tariff liberalization with the European Union, the Southern African Customs Union, the United States and the Southern African Customs Union jointly, and with all of its trade constituents, impacts the output volumes, export volumes, import volumes, welfare, foreign exchange rate, value-added tax rates, lump-sum taxation, skilled labor wage, unskilled labor wage, and the rental rate of capital.

The output volumes are negatively impacted by the joint preferential price removals and tariff liberalization for all sectors except the Export Processing Zone Manufacturing sector. So, the EPZ sector is the only sector with any positive output volume changes and they exceed the increases exhibited for the sector in the EU-U.S. preferential price cut case, the EU preferential price cut case with tariff liberalization, and the U.S. preferential price cut case with tariff liberalization. The largest output volume increases occur in the unilateral tariff liberalization case followed by a smaller, but still substantial effect, in the European Union tariff liberalization case. This is largely due to the Export Processing Zone Manufacturing sector's heavy import dependence.

However, the largest declines in the output volumes in the Sugarcane and the Sugar Milling sectors, as well as in the Other Manufacturing and the Other Services sectors. In the tariff liberalization with the European Union, the Other Services sector has the largest decreases, followed by the Sugarcane sector, then the OMA sector, and finally the Sugar Milling sector. In the SACU TL and U.S. SACU TL cases, the SUG sector has the largest decrease followed by the SMI sector, and are not closely followed by decreases in any other sector. But, in the full unilateral tariff liberalization case, the Other Services sector has the largest absolute decreases, the Other Manufacturing sector the second largest decreases, and the third largest decreases are in the Sugarcane sector. This is primarily due to sectors such as the Other Agriculture, Sugar Milling, Other Manufacturing, and the Other Services being import-competing. The U.S. price cut with tariff liberalization simulation set differs in that the only significant decreases that occur in the EU TL and the FUTL cases are the Other Services sector and the Other Manufacturing sectors, in order of magnitude, largely due to a lessened sugar export price blow. The increases

and decreases in output quantity are always starker with tariff liberalization than without, and varying rank occurs amongst the sectors with output decreases.

With export quantity changes, the largest and most important percentage and absolute changes occur in the Export Processing Zone Manufacturing sector. But, this is driven by its increased output since it is such a dominant exporting sector. Again, the relevant tariff liberalization cases of increase are the EU TL and the FUTL cases. And, as in the output volume case, the increases exceed the increases found in the pure EU-U.S. price cut case, the EU price cut with tariff liberalization case, and the U.S. price cut with tariff liberalization because of cheaper imported input prices allowing its output capacity to increase, and thus, increasing its export volume. The sole sector of export decreases is the Sugar Milling sector with the EU price cut with tariff liberalization case and the EU-U.S. price cut with tariff liberalization case. This follows from the Sugar Milling sector now losing preferential pricing for 99.11% versus 95.34% of its total sugar exports. In the U.S. case, due to less sugar exports being affected by the sugar export price liberalization, comparable and still significant decreases in export volumes occur in the Sugar Milling, Other Manufacturing, and the Other Services sectors. The export changes in the EU-U.S. price cut with tariff liberalization are larger than its EU-U.S. price cut alone or its EU and U.S. counterparts in isolation. The aggregate export volumes increase for all preferential price removal with tariff liberalization scenarios suggesting that import tariffs are biased against exports.

In the case of import quantity changes, the sectors with major increases in import quantity are the Export Processing Zone Manufacturing sector, the Other Manufacturing sector, and the Other Services sector, with the latter only having substantial absolute increases in tariff liberalization with the European Union and with all of its trade partners. The EPZ sector's

increase is because of the sector being the second largest demander of imports in the Mauritian economy and to a lesser extent to a loss in tariff protection. The Other Manufacturing and the Other Services sectors' import quantity increases are primarily due to their loss of protection, which is the largest with full unilateral tariff liberalization followed by tariff liberalization with the European Union, in order of magnitude. The Transport, Storage, and Communication and the Restaurants and Hotels sectors, in order of magnitude suffer declines in import quantities. However, they are such a small portion of the overall import volume, the changes are negligible. The aggregate import volumes increase for all tariff liberalization cases as well because several sectors such as the Other Agriculture, Sugar Milling, Other Manufacturing, and Other Services sectors are highly protected.

Welfare decreases for all tariff liberalization cases. It decreases by a range of [-0.81%, -0.10%] with value-added tax replacement and [-0.61%, -0.10%] in the lump-sum tax case. The largest decreases always occur in either the EU TL case or in the FUTL case, with the largest decrease always occurring in the full unilateral tariff liberalization case with value-added tax replacement. The real exchange rate rises and falls for all price removal cases with tariff liberalization by as much as –4.10% and 1.02% across both tax replacements and all simulation sets. But, the wavering is simply the result of tariff liberalization effect going in the opposite direction of the sugar export price reduction effects, where the former appreciates the rupee and the latter depreciates the rupee. The value-added tax rate and the lump-sum taxation always increase by a range of [0.81%, 113.68%] to cover the loss in tariff revenues and the lump-sum tax rises by as small as 0.03 billion rupees or as much as 3.90 billion rupees to replace lost tariff revenues.

In the factor price changes the skilled labor wage increases in the SACU and U.S.-SACU tariff liberalization cases, but decreases in the EU TL and the FUTL cases. The unskilled labor wage increases for all tariff liberalization cases and this is compliant with the characteristic that the output quantity increases occur in the EPZ sector which has a labor force that is 76.76% and the sector accounting for 40.20% of the unskilled labor employment in the updated benchmark. Lastly, the rental rate of capital increases for all but the unilateral free trade agreement with value-added tax replacement. The rental rate increases are also driven by the output volume changes in the Export Processing Zone Manufacturing sector because it is capital-intensive, but the decreases are due to the Sugar Milling, Other Manufacturing, and the Electricity, Gas, and Water sectors output being depressed by the greatest extent in the full tariff liberalization with value-added tax replacement because of their 10.00% value-added tax rate levies. Furthermore, the ratios of the percentage changes, with the unskilled labor wage as the numeraire, yields that the skilled laborer is always worse off than the unskilled laborer, and the unskilled laborer is only better off than the capitalist in the European Union and full unilateral tariff liberalization cases with tariff liberalization.

Placing the emphasis back on the preferential pricing effects being damped by unilateral tariff liberalization with the European Union, the Southern African Customs Union, the United States and the Southern African Customs Union, and with all of its trade constituents, it is clear that these particular policy implementation are not welfare-improving. They consistently decrease the overall welfare of the economy, and, a result, prove not to be the best policy alternatives to decreases in welfare through preferential price removal. The theory of the second best is supported here in that a removal of another distortion in the presence of other distortions (i.e. indirect taxation, value-added taxation, etc.) is not necessarily welfare-improving, where

none of the distortionary tariff liberalization cases increase welfare. Other alternative trade policy changes may exist that will cause welfare to rise, but the EU TL, SACU TL, U.S.-SACU TL, and the FUTL policies are not the optimal policies to use to counteract sugar export price decreases.

Chapter 5 will recap each of the preferential price changes results in isolation and with tariff liberalization to display the changes in the Mauritian economy, giving supporting evidence as to the non-welfare improving effects of the EU, U.S., and EU-U.S. preferential price removals when combined with implementation of the unilateral tariff liberalization with the EU, SACU, U.S.-SACU, and with all of its trade constituents. Future research and policy recommendations will also be addressed at that time.

5.0 CHAPTER 5

This study analyzes the impact of European Union and the United States' inflated sugar prices for sugar exports originating in Mauritius being removed separately, jointly, and then in conjunction with unilateral tariff liberalization for the European Union, the Southern African Customs Union, the United States and the Southern African Customs Union jointly, and with all of its trade constituents, through a computable general equilibrium model that is based on the Author's computed 1997 Input-Output Table of Mauritius. The subsequent results yield that each policy reform matters in terms of its effects on the economy of Mauritius. This chapter will first outline the conclusion drawn from the numerous experiments performed. Next, I will describe the further model developments that are the basis of the future research using this CGE model. Lastly, I will present policy recommendations that are based on the findings.

5.1 CONCLUSIONS

There are six separate sets of simulations that are performed in this study. The changes in the output, export, and import volumes by sector, welfare, foreign exchange rate, value-added tax rate, lump-sum taxation, skilled labor wage, unskilled labor wage, and the rental rate of capital as a result of the implemented policy or set of policies are addressed below. Each simulation run is performed from the updated benchmark economy, which is inclusive of the

tariff rate changes that occur in the economy from 1997-2000 and incorporates the introduction of the value-added tax rate in 1998. Thus, I will present the conclusions and results for each simulation set in the next six sections.

5.1.1 59% Mauritius Sugar Export Price Reduction by the European Union

The sugar export price cut of 59% for the Mauritius sugar exports flowing into European Union are applied in this simulation set. Within this simulation set, the only significant output volume increases occur in the Export Processing Zone Manufacturing sector. The relative decrease in the unskilled labor wage in comparison to the skilled labor wage or the rental rate of capital, the increase in the output volume of the Other Manufacturing sector, the depreciation of the rupee in the value-added tax replacement case, and the downward scaling of the value-added tax rate in the value-added tax replacement scenario all contribute to the increases in the output volume of the EPZ sector. However, the sharpest declines in output quantities occur in the Sugarcane and the Sugar Milling sectors, in both percentage and absolute terms. These declines are the result of the Sugar Milling sector's sugar export price decreasing and it exports the majority of its total domestic supply and given that the Sugar Milling sector is the only customer of the Sugarcane sector, the Sugarcane sector's output volume falls as well.

With export volumes changes, the largest expansions occur in the Export Processing Zone Manufacturing sector and the largest decreases occur in the Sugar Milling sector. The Export Processing Zone Manufacturing sector is a key exporter in the economy such that any increases in output will be accompanied by increases in exports. But, the Sugar Milling sector's sugar exports experience the preferential price loss and therefore the sector's total export quantity contracts.

The import quantity increases by a substantial amount in the Sugar Milling, Export Processing Zone Manufacturing, and the Other Manufacturing sectors. On the other hand, the Transport, Storage, and Communication sector suffers the largest percentage and absolute decreases in import quantities. The Sugar Milling sector's increases are driven by the consumption demand that still exists for sugar and changes substantially because of its small base quantity, but the Export Processing Zone Manufacturing sector increases it import quantity substantially because it is import dependent and experienced output volume increases. The Other Manufacturing sector adheres to the same profile of change as the Export Processing Zone Manufacturing sector. However, the Transport, Storage, and Communication sector's import volumes fall due to output volume decreases in the Sugarcane and the Sugar Milling sector, which cause the Transport, Storage, and Communciation sector's output to decrease, and thus its import quantities decrease.

The welfare effects are small, but significantly negative, with a decrease of -0.23% in value-added tax case and a –0.29% decline in the lump-sum tax case, with the least negative welfare outcome is where value-added tax rate adjusts to account for increases in tax revenues from the sugar price cut. Currency depreciates with value-added tax replacement but appreciates marginally in the lump-sum tax scenario. The sugar export price declines drive the former finding. The value-added tax rate is scaled downward and the lump-sum taxation decreases because of changes in the output and import quantities. This occurs from increasing output and imports in the most heavily taxed sectors such as Other Agriculture sector, the Export Processing Zone Manufacturing sector, the Other Manufacturing sector, and the Electricity and Gas sector.

All factor incomes benefit in the value-added tax case, but the only the skilled labor and the capitalist wage increase in the lump-sum tax case. The increases in the skilled labor wage,

unskilled labor wage, and the rental rate of capital occur in the value-added tax case because of the increases in output volume of the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sectors. In the lump-sum tax case, the skilled labor wage and the rental rate of capital increases because of output volume increases in the Other Agriculture, Export Processing Zone Manufacturing, and the Other Manufacturing sectors. For unskilled labor, the wage falls in the lump-sum tax case. The sectors that are predominately unskilled incur output volume increases, namely the Other Agriculture, Export Processing Zone Manufacturing, and the Other Manufacturing sector, along with the increases in unskilled labor demand in the Construction and the Wholesale and Retail Trade and Repairs sectors. But, the decreases in the Sugarcane, Sugar Milling, Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors actually cause the unskilled labor wage to decrease in the lump-sum tax case. The percentage change in the ratio of factor prices yields that unskilled workers are more adversely affected than either the skilled workers or the capitalists. Hence, evidence is presented that the European Union preferential pricing agreement for Mauritius' sugar exports does matter in terms of its linkages with other sectors in the economy and its removal does indeed hurt welfare.

5.1.2 45% Mauritius Sugar Export Price Reduction by the United States

The economic effects of sugar export price removal by the United States are captured in this simulation set. The percentage changes are typically smaller here, given that only 3.77% of the total sugar exports of the Sugar Milling sector are affected by the U.S. preferential price change. Focusing on output quantities, the Export Processing Zone Manufacturing sector's absolute output volume increases are still the most relevant. Again, the relative decrease in the

unskilled labor wage in the lump-sum tax case, increases in the OMA sector's output volume for both tax replacement scenarios, the depreciation of the rupee in the value-added tax case, and the downward scaling of the value-added tax rate in the value-added tax replacement scenario contribute to the increases in output in the EPZ sector. In the case of output volume decreases, the Sugar Milling and Sugarcane sectors are the most adversely affected sectors in the lump-sum tax case, while the Wholesale Retail Trade and Repairs and the Transport, Storage, and Communication sectors' decreases in output dominate the former sectors' decreases in output in the value-added tax case. However, all output decreases are marginal.

Furthermore, with export volume changes, the increases are only relevant for the Export Processing Zone Manufacturing sector in this case as well. Again, the Export Processing Zone Manufacturing sector comprises a sizable portion of the total updated export quantity and thus any changes in its output will translate into changes in its exports. And, the steepest absolute declines in export volume still occur in the Sugar Milling sector, in both percentage and absolute terms. This is a first order condition of the sugar export price cut occurring in that it experiences the price cut directly.

On the other hand, the only significant import quantity increases occur in the Export Processing Zone Manufacturing and the Other Manufacturing sectors. However, both sectors are import dependent and experience output volume increases. And, given such a small portion of the total sugar exports are affected in this case, the decreases in import quantity are marginal for the Transport, Storage, and Communication and the Restaurants and Hotels sectors, the two sectors that experience the steepest import quantity declines in this simulation set.

The welfare actually increases by a small amount in the value-added tax case at 0.05%, but falls by –0.01% in the lump-sum tax case, where the changes are both essentially equivalent

to zero. The rupee still depreciates in the value-added tax case, but appreciates by a marginal amount in the lump-sum tax case. The sugar export price decreases causes the rupee to be cheaper in terms of foreign currency in the value-added tax replacement case. The value-added tax rates are scaled downward and the lump-sum taxation falls because of the tax revenue increasing in the economy based on the output and import quantity changes that occur with the preferential price removal. In particular, increases in the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, Electricity, Gas, and Water, and the Other Services sectors would produce this result.

The skilled labor wage still increases for both tax replacements. In the value-added tax case the Export Processing Zone Manufacturing sector's increase in output primarily causes this wage increase, but increases in output in the Other Manufacturing, Electricity, Gas, and Water, and the Other Services sectors also contribute to the skilled labor wage increase. In the lump-sum tax case, all of the prior sectors experience output volume increases except the Other Services sector. The unskilled labor wage still increases in the value-added tax case and falls in the lump-sum tax case. In the value-added tax case, the unskilled labor wage increases because of the output volume increases in the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sectors. But, the unskilled labor wage decreases in the lump-sum tax case because the unskilled labor demand decreases in the predominately unskilled labor sectors (i.e. the Sugarcane, Sugar Milling, Construction, Wholesale and Retail Trade and Repairs, Restaurants and Hotels, and the Transport, Storage, and Communication sectors) outweigh the pressure on the wage to increase.

However, the rental rate of capital increases for both tax replacements. Its increase is the result of the increases in the Other Agriculture, Export Processing Zone Manufacturing, Other

Manufacturing, Electricity, Gas, and Water, and the Other Services sectors' output increases. Only the output volume increases that occur in the in the Other Agriculture and the Export Processing Zone Manufacturing sectors in the lump-sum tax case cause the rental rate of capital to increase. The percentage change in the relative factor prices reflects that the unskilled laborer is better off than the skilled laborer or the capitalist in the value-added tax case, but is worse off than either the skilled laborer or the capitalist in the lump-sum tax case. Thus, preferential pricing removal by the United States, although it affects a smaller portion of the overall sugar exports, still produces significant quantity effects within other sectors, although the welfare effects are minute.

5.1.3 59% Mauritius Sugar Export Price Reduction by the European Union and a 45% Mauritius Sugar Export Price Reduction by the United States

The simulation results of the joint price cuts of the sugar export price of Mauritius' sugar will be presented here. Given that 99.11% of the total sugar exports are affected by the price cuts, the overall quantity movements are usually larger. In the output volume, the largest and most significant absolute changes occur in the Export Processing Zone Manufacturing sector, and they are in excess of the increases in volume found in either the EU or the U.S. price cut cases alone. The Export Processing Zone Manufacturing sector still benefits from the unskilled labor wage falling relative to either the skilled labor wage or the rental rate of capital, the Other Manufacturing sector's output volume increases, the depreciation of the rupee in the value-added tax case, and the downward scaling of the value-added tax rate in the value-added tax replacement scenario. And, the dual price cut case reflects that the Sugarcane and the Sugar Milling sectors suffer the sharpest percentage and absolute quantity decreases in output volume

and the decreases in these sectors are also in excess of what is found in its European Union or the U.S. price cut simulation runs. But again, the Sugar Milling sector incurs the sugar export price cut and the Sugarcane sector only sells to the Sugar Milling sector.

Again, the Export Processing Zone Manufacturing sector dominates the export volume increases in percentage and absolute terms. This is because the sector is a key exporting sector in the Mauritian economy and experiences output increases, as previously stated. The export volume increases are larger than what occur in the EU and the U.S. preferential price removal cases in isolation. The Sugar Milling sector suffers the most substantial percentage and absolute declines in export quantity, also surpassing the EU price cut and the U.S. price cut cases. However, an even greater percentage of the sector's total exports are affected by the sugar export price changes and therefore its export volume contract even further.

In terms of import volume changes, the Sugar Milling, Export Processing Zone Manufacturing, and the Other Manufacturing sectors each have sizable increases in their import volumes. And, the increases are larger than the increases produced in the EU or U.S. price cut simulations alone. As previously argued, the Sugar Milling sector's increases are reflective of its small base quantity, but also because the domestic consumption the sector provides must still be met, while the Export Processing Zone Manufacturing and the Other Manufacturing sectors' import quantity increases occur due to their strong import dependence and output volume increases. However, the Transport, Storage, and Communication sector touts the more formidable import volume decreases, exceeding the declines that occur in European Union and the United States preferential price removal cases in isolation. As before, the TSC sector's tie to the Sugarcane and the Sugar Milling sectors' output volume declines, which cause its output volume to decrease, and hence causes its import quantity to fall.

The welfare decreases marginally by –0.03% in the value-added tax case, but by –0.32%, which is still small, but significant, in the lump-sum tax case. The rupee depreciates in the value-added tax case, but appreciates in the lump-sum tax case by a minute amount. Still the sugar export price decreases produce a depreciation of the rupee in the value-added tax case. Furthermore, the value-added tax rate and the lump-sum taxation, based on the increases in tax revenue from output and import quantity changes, decrease by –20.34% and –0.72 billion rupees respectively. But, as previously shown, the increases in the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sectors' output and/or import quantity foster such tax changes since the sectors incur heavy value-added and/or import tariff taxation.

Furthermore, the skilled labor wage increases in the value-added and lump-sum tax cases. The skilled labor wage increases are primarily driven by the output increases in the Export Processing Zone Manufacturing sector, but also by the output increases in the Other Agriculture, Other Manufacturing, and the Electricity, Gas, and Water sectors in the value-added tax case. But, in the lump-sum tax case, the output volume increases in the Other Agriculture, Export Processing Zone Manufacturing, and the Other Manufacturing sectors increases the skilled labor wage. The unskilled labor wage increases in the value-added tax case and decreases in the lump-sum tax case. Again, the impetus for the increase are output quantity increases in the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sector. The decrease in wage occurs from the downward pressure on the unskilled labor wage via decreased demand in the Sugarcane, Sugar Milling, Restaurants and Hotels, Transport, Storage, and Communication, and the Other Services sectors overriding the

upward pressure on the unskilled labor wage from unskilled labor demand increases in the Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing sectors.

Moreover, the rental rate of capital increases for both tax replacements. The Other Agriculture, Export Processing Zone Manufacturing, Other Manufacturing, and the Electricity, Gas, and Water sectors' output volumes increase in the value-added tax case, which place upward pressure on the rental rate of capital, but in the lump-sum tax case the Other Agriculture and Export Processing Zone Manufacturing sectors drive the rental rate of capital increase. The relative wage comparison reflects that the unskilled laborer is worse off than either the skilled laborer or the capitalist here. Thus, the preferential price removal by the European Union and the United States does cause sizable quantity shifts within other sectors and does decrease welfare, with the least welfare-improving case occurring with lump-sum tax replacement.

5.1.4 59% Mauritius Sugar Export Price Reduction for the European Union with Tariff Liberalization

The economic effects of the preferential price removal by the European Union and the implementation of unilateral tariff liberalization with the European Union, the Southern African Customs Union, the United States and the Southern African Customs Union jointly, and with all of Mauritius' trade constituents are presented in this simulation set. With tariff liberalization, the Export Processing Zone Manufacturing sector becomes the only sector that experiences output volume increases. However, the increases remain substantial and are even larger than what occur in the EU price cut case alone. The EPZ sector benefits the most from the full tariff liberalization, followed by tariff liberalization with the European Union. The tariff liberalization

cases that induce a devaluation of the rupee would promote the output volume increases in this sector (all cases except the EU TL and FUTL cases with value-added tax replacement).

The Sugarcane and Sugar Milling sectors output volumes still contract considerably in this simulation set, but the Other Manufacturing and Other Services sectors experience sizable contractions as well. The Sugarcane and the Sugar Milling sectors' output falls because the sugar export price cut directly affects the Sugar Milling sector and the Sugarcane sector's only customer is the Sugar Milling sector. But, the output volume decreases by an even greater amount in this simulation set because the Sugar Milling sector loses its protection and it is an import-competing sector. Also, the Sugarcane and the Sugar Milling sectors are not favored in the value-added tax replacement case because they both have high value-added rate levied on them and the rates increase to replace lost tariff revenue. For both the Sugarcane and the Sugar Milling sectors, the largest output volume declines takes place in the full tariff liberalization case, the case where the only two regions that import sugar into Mauritius are liberalized jointly.

The Other Manufacturing and the Other Services sectors' output volume decreases are the largest in the European Union and the full unilateral tariff liberalization cases. Tariff liberalization causes the sectors to exhibit output decreases that are even larger in magnitude than the decreases incurred by the Sugarcane and Sugar Milling sector. The main driver of the decreases in output in the Other Manufacturing and the Other Services sectors is that they lose their tariff protection, are import-competing, and in the value-added tax replacement, have their high value-added tax rates rise even further to replace lost tariff revenues. All output contractions exceed the European Union preferential price removal case in isolation.

In terms of export quantity changes, the increases in the Export Processing Zone Manufacturing sector still dominate all other export quantity increases in the economy. The

changes also exceed the pure EU price cut case. The EPZ sector further benefits with tariff liberalization because it is import dependent. And, tariff liberalization with the European Union and full unilateral tariff liberalization, where the latter case produces the most substantial increases in export volume, causes the largest export volume expansions for the Export Processing Zone Manufacturing sector. However, while the Sugar Milling sector suffers the most substantial decreases in export volume for all tariff liberalization cases, the Other Services sector faces formidable export quantity decreases in the full unilateral tariff liberalization case. The Sugar Milling sector's decline is not only due to the obvious loss of the preferential price for the EU, but because of its loss of protection in this simulation set. The Other Services sector's export quantity declines are the starkest in the full tariff liberalization because its output is most depressed in that case. It too is a heavily protected sector and because of the loss of protection, it suffers an export quantity decrease as well. Lerner Symmetry is supported here, where the aggregate export volume increases for all tariff liberalization cases.

Moreover, the largest import volume increases belong to the Export Processing Zone Manufacturing, Other Manufacturing, and the Other Services sectors. With tariff liberalization, the Export Processing Zone Manufacturing and the Other Manufacturing sectors have greater import volume increases and produces sizable increases in import volume for the Other Services sector as well, all of which differ from the EU price cut case alone. Since the Export Processing Zone Manufacturing sector is import dependent it is favored by lower imported input costs. And, even though it only has a tariff levy of 2.91%, import quantities would increase somewhat with the removal of the protective tariff. The Other Manufacturing and the Other Services sectors experience an influx of imports due to their loss of protection. On the other hand, the Transport, Storage, and Communications sector still incurs the largest decreases in import quantity, but the

changes are still negligible. The aggregate import volumes increase for all tariff liberalization cases. But, this is because the import volume increases in the most heavily protected sectors, namely the Other Agriculture, Sugar Milling, Other Manufacturing, and the Other Services sectors.

The welfare is negatively impacted for all tariff liberalization cases, with decreases that are –0.39% to –0.79%. The welfare decreases exceed the pure EU price cut case. The welfare decline is greatest in the full unilateral tariff liberalization case with value-added tax replacement. However, unilateral tariff liberalization with the Southern African Customs Union carries the smallest welfare decline for both tax replacements. The foreign exchange rate both increases and decreases with value-added tax replacement, with the rupee appreciating in the European Union, United States and Southern African Customs Union, and the full unilateral tariff liberalization cases, while depreciating marginally in the Southern African Customs Union's tariff liberalization case. However, the rupee only depreciates with the lump-sum tax replacement and this depreciation occurs by a minute amount in the Southern African Custom Union and the U.S.-SACU tariff liberalization scenarios. All in all, the real foreign exchange rate changes reflect the opposite effects of sugar export price reductions and import tariff liberalization on the rupee. And, in order to replace such a formidable tax revenue generator, tariff revenue, the value-added tax rates are scaled up by as much as 113.62% and the lump-sum tax increases by as much as 3.90 billion rupees to do so. The tax changes that occur here are greater than what occurs in the pure EU price cut case alone.

With factor inputs, the skilled laborer wage increases in the Southern African Customs Union and in the joint United States and the Southern African Customs Union tariff liberalization cases, but the wage falls in the European Union and in the full unilateral tariff liberalization

cases. The skilled labor wage increases from the EPZ sector's increase in output primarily and also from the Construction sector's skilled labor demand increase. However, the upward pressure that the skilled labor demand increases place on the wage are not enough to counteract the downward pressure placed on the wage from all other sectors' declining labor demand, especially in the Other Services sector, in the European Union and the full tariff liberalization cases. The unskilled labor wage increases for all tariff liberalization cases. The unskilled labor wage increases are driven by the Export Processing Zone Manufacturing sector's output volume increases.

The rental rate of capital benefits for all trade policy choices except the unilateral tariff liberalization case. The capital price increases are the result of output increases in the Export Processing Zone Manufacturing sector and, to a lesser extent, from the increased rental rate of capital demand in the Construction sector as well. What occurs in the full unilateral tariff liberalization case with value-added tax replacement is that the capital-intensive sectors are hurt the most because several sectors have high value-added tax rate levies, namely the Sugar Milling, Other Manufacturing, and the Electricity, Gas, and Water sectors, and their subsequent capital demand declines actually depress the rental rate of capital. With the percentage changes of the ratios of factor prices reflect that the skilled labor is worse off than the unskilled laborer and the unskilled laborer is better off than the capitalist only with the European Union and the full unilateral tariff liberalization cases. Thus, the results suggest that it undesirable to implement unilateral tariff liberalization with the EU, SACU, U.S., or with all of Mauritius' trade constituents when the European Union preferential price for Mauritius' sugar exports because the tariff adoptions actually induce sizable quantity changes in other sectors and produces even deeper welfare decreases than the EU price cut case in isolation.

5.1.5 45% Mauritius Sugar Export Price Reduction by the United States with Tariff Liberalization

The effects of the United States sugar export price reduction, when combined with the four tariff liberalization cases, will be addressed here. Again, the Export Processing Zone Manufacturing sector incurs the only output volume increases. But, as previously stated, the sector is import dependent and is thus favored by the decreases in import tariffs. However, the depreciations in the rupee also spawn output volume increases in the sector. The output volume changes are larger in this simulation set than in the U.S. price cut case alone. And, the EPZ sector's largest increases occur in the EU tariff liberalization case and in the full unilateral tariff liberalization case. With output quantity decreases, the largest output volume declines occur in the Other Services sector. However, substantial output decreases take place in the Other Manufacturing sector for all tariff liberalization cases except for the Southern African Customs Union region and comparable decreases for the Sugar Milling and Sugarcane sector occur in the Southern African Customs Union and in the joint United States and the Southern African Customs Union tariff liberalization cases. The Other Services, Other Manufacturing, and the Sugar Milling sectors lose their tariff protection and are import-competing. As a result, the sectors' output volumes decrease. And, the Sugarcane sector, given its tie to the Sugar Milling sector, experiences decreases in output from the Sugar Milling sector's output declines. The largest output volume declines occur in the European Union and in the full unilateral tariff liberalization cases for the Other Services and the Other Manufacturing sectors.

The Export Processing Zone Manufacturing sector also holds the largest increases in the export quantity, which are more pronounced than in the U.S. price cut case, are smaller than in the EU price cut case, and where the largest export volume expansions occur in the European

Union and in the full unilateral tariff liberalization cases. However, the EPZ sector is a key exporting sector in the economy and its increased output would allow for increased exports. And, the Sugar Milling, Other Manufacturing, and the Other Services sectors' absolute export quantity decreases are the most substantial in the economy and they are greater than the decreases that occur in the pure U.S. price cut case, but are less than the decreases that occur in the EU price cut case. Again, the largest decreases in each sector occur in the European Union and in the full unilateral tariff liberalization cases. The Sugar Milling sector is adversely affected because of the sugar export price reduction and also because it is import-competing. So, with its total output being even smaller, the Sugar Milling sector has even less goods available to export. The Other Manufacturing and the Other Services sectors lose their protection with tariff liberalization and are import-competing. Since their output volumes are depressed, they too have less output to export.

With import quantity changes, the Export Processing Zone Manufacturing, Other Manufacturing, and the Other Services sector have the most substantial increases and the only decreases that occur are in the Restaurant and Hotels and the Transport, Storage, and Communication sectors, where the decreases are marginal. The Export Processing Zone Manufacturing sector is favored by cheaper imported inputs. The Other Manufacturing and the Other Services sectors have high tariff protection and with its loss, they experience formidable increases in their import quantities. The import quantity increases and decreases that occur here are greater than what occurs in the U.S. price cut case alone, but are less than what occurs in the EU price cut case. In the Export Processing Zone Manufacturing sector, the largest import quantity increases occur in the full unilateral tariff liberalization case due to all of its imported inputs becoming cheaper in this trade scenario. The Other Manufacturing sector and the Other

Services sectors both experience their largest import volume increases in the European Union and full tariff liberalization cases. The reasoning behind the sizable increases occurring in these tariff liberalization cases is because the EU accounts for 39.6% and 70.6% of the import volume for the OMA and the OSR sectors respectively, which points to a sizable portion of the sectors imports being liberalized with liberalization with the European Union, and then with the full unilateral tariff liberalization, the maximum amount of imports experience liberalization. Given each sector is highly protected, the more goods and services that are liberalized, the larger the import volume flow will be. Moreover, aggregate import volumes increase for all tariff liberalization scenarios, promoted by the increases in the import volume in the highly protected sectors, namely the Other Agriculture, Sugar Milling, Other Manufacturing, and the Other Services sectors.

All tariff liberalization adoptions cause steeper declines in welfare than the pure United States preferential price removal case without tariff liberalization. Again, the largest welfare decrease occurs in the full unilateral tariff liberalization with value-added tax replacement, reflecting a –0.50% decrease. Also, the least negative welfare effects occur in the Southern African Customs Union tariff liberalization case. In fact, the welfare decreases in the Southern African Customs Union and the joint United States and Southern African Custom Union tariff liberalization cases are almost negligible across both tax replacements. The foreign exchange rate changes are dependent on what tariff liberalization cases and tax replacements are chosen, where the rupee appreciates in the value-added tax replacement for the EU and full tariff liberalization cases but strictly depreciates across all tariff liberalization scenarios in the lump-sum tax case. The sugar export preferential price removal causes the rupee to depreciate, while the removal of import tariffs causes the rupee to appreciate. Therefore, the mixture of both

effects produces the movements in the real foreign exchange rate as evidenced in this simulation set. Likewise, as in the EU price cut case with tariff liberalization, the value-added tax and lump-sum tax are forced to increase to cover the windfall of tariff revenue losses that occur from liberalization, increasing by as much as 112.63% and 3.88 billion rupees respectively.

The skilled labor wage increases in the Southern African Customs Union and in the joint United States and the Southern African Customs Union tariff liberalization cases and decreases in the European Union and full tariff liberalization cases. The wage increases occur from the output volume increases in the Export Processing Zone Manufacturing sector. However, the skilled labor wage decreases because the increase in skilled labor demand in the Export Processing Zone Manufacturing sector and minutely so in the Construction sector, coupled with sizable decreases in skilled labor demand for the Other Services sector and decreases in all other sectors' skilled labor demand, causes the skilled labor wage to fall. The Export Processing Zone Manufacturing sector's output volume increases place upward pressure on the unskilled labor wage as well, causing the unskilled labor wage to increase for all tariff liberalization scenarios.

The rental rate of capital increases for all tariff policy and tax replacement choices except in the unilateral tariff liberalization with value-added tax replacement case. The increases occur from the increased output volumes in the EPZ sector. But, it is also influenced by the increases in capital demand in the Construction sector, to a lesser degree. The decrease in the capital price occurs in the full tariff liberalization with value-added tax replacement because the capital-intensive sectors, the Sugar Milling, Other Manufacturing, and the Electricity, Gas, and Water sectors, experience the steepest output volume contractions in the full tariff liberalization case because they are high value-added tax levy holders and thus place more downward pressure on the rental rate of capital than the upward pressure on the rental rate of capital that occurs through

the EPZ and the CON sectors' capital demand increases. The percentage change in the relative factor price display how the unskilled labor wage is helped more than any other factor with tariff liberalization, where the unskilled labor wage rises relative to both the skilled labor wage and the rental rate of capital. All in all, the unilateral tariff liberalization policies that can be implemented with the sugar export price change by the United States are not welfare-improving, but can decrease welfare by up to an additional –0.55%, and are thus not desirable policies to implement with the loss of the U.S. preferential pricing.

5.1.6 59% Mauritius Sugar Export Price Reduction by the European Union and a 45% Mauritius Sugar Export Price Reduction by the United States with Tariff Liberalization

The effects of the joint removal of preferential pricing for Mauritius' sugar exports and the implementation of unilateral tariff liberalization with the European Union, the Southern African Customs Union, the United States and Southern African Customs Union jointly, and with all Mauritius' trade constituents are outlined in this section. The output volume increases are only substantial for the Export Processing Zone Manufacturing sector. The output quantity increases here surpass the increases in the pure EU-U.S. price cut case as well as in the singular EU and U.S. price cut cases. The EPZ sector's largest output volume increases occur in the European Union and in the full tariff liberalization cases. Again, the impetus of the larger output volume increases is the depreciation of the rupee but is also because the Export Processing Zone Manufacturing sector is import dependent.

Furthermore, the largest declines in output volume belong to the Sugarcane and the Sugar Milling sectors. The Sugarcane sector suffers its largest declines, from largest to the smallest, in the full unilateral tariff liberalization case, the joint United States and the Southern African

Customs Union tariff liberalization case, the Southern African Customs Union tariff liberalization case, and the European Union tariff liberalization case, for both tax replacement choices. But, the only two regions that import sugar into the economy are both liberalized in the unilateral tariff liberalization case, which is why the decline is greatest in the full tariff liberalization case because the Sugar Milling sector, its only customer, loses its tariff protection and is import-competing. The Sugar Milling sector's largest output volume declines occur in the full unilateral tariff liberalization case, although all of the tariff liberalizations scenarios produce about the same sized declines in output for this sector. Again, the only two regions from which sugar imports originate are liberalized in the full tariff liberalization case, and because the Sugar Milling sector is highly protected and import-competing, its output volume is depressed. The output volume decreases in these two sectors are quantitatively larger than in the EU-U.S. price cut case as well as either EU or U.S. price cut with tariff liberalization case separately.

The Other Manufacturing and the Other Services sectors experience substantial decreases in output in both the European Union and the full unilateral tariff liberalization cases. The Other Manufacturing and the Other Services sectors output volumes fall because of their loss of tariff protection and they both are import-competing sectors. Their decreases are also more substantial than in the pure EU-U.S. price cut case alone, the EU price cut with tariff liberalization, or the U.S. price cut with tariff liberalization cases.

Furthermore, the export volume increases are largest for the Export Processing Zone Manufacturing sector, exceeding the increases that occur in all the former simulation sets. The largest export quantity increases for the EPZ sector still occur in the European Union and in the full unilateral tariff liberalization cases. The cheaper imported inputs allow for greater output volume in the sector, and hence more export volume from the sector. But, the export quantities

for the Sugar Milling sector decline more steeply than in either the pure EU-U.S. price cut case, the EU price cut with tariff liberalization case, or the U.S. price cut with tariff liberalization case. The sector's steepest decreases occur in the full unilateral tariff liberalization scenarios, although all trade policy adoptions produce similar decreases. However, as previously stated, the Sugar Milling sector suffers the loss of preferential pricing directly and thus the sector's export quantity contracts. But given the Sugar Milling sector is an import-competing sector, it export volume declines further than what the sugar export price reduction causes in isolation. The Lerner Symmetry theorem is supported in that for every implemented tariff liberalization policy, the aggregate export volumes increase.

Import quantities increase for the Export Processing Zone Manufacturing, Other Manufacturing, and the Other Services sectors, where they are usually larger in magnitude than the EU-U.S. preferential price removal case alone, the European Union price cut with tariff liberalization, and the United States price cut with tariff liberalization, sans the Other Services sector having increases in import volume in this case that are smaller than those found in the United States case. As previously argued, the Export Processing Zone Manufacturing sector is highly import dependent, so increases in its output would raise its imported input demand as well. However, the loss of its low tariff protection would also bolster its import quantity flows to some degree. The Transport, Storage, and Communication sector, on the other hand, suffers the largest declines in import volume, but the absolute decreases are minute. Aggregate import quantities, via tariff liberalization, increase for each case because the heavily protected sectors such as the Other Agriculture, Sugar Milling, Other Manufacturing, and the Other Services sectors' imports increase from a loss of protection.

Welfare decreases take place for all the various tariff liberalization cases, where the welfare declines range from –0.41% to –0.81%. Again, the largest decreases in welfare occur in the full unilateral tariff liberalization case with value-added tax replacement and the smallest in the SACU tariff liberalization case. The foreign exchange rate decreases for the European Union tariff liberalization case, the joint United States and Southern African Customs Union tariff liberalization case, and the unilateral tariff liberalization case with value-added tax replacement, which signifies an appreciation of the rupee, while increasing for all other scenarios, which denotes a depreciation of the rupee. Since sugar export price declines and import tariff liberalization effects on the rupee move in opposite directions, the mixture of the foreign exchange rate changes take place. The value-added tax rate and lump-sum tax increases across the various tariff liberalization cases, with the value-added tax rate scaling ranging from 0.81% to 113.68% and the lump-sum taxation increasing by 0.03 to 3.90 billion rupees.

The skilled labor wage increases in the Southern African Customs Union and the joint United States and Southern African Customs Union tariff liberalization cases, while falling in the European Union and the full unilateral tariff liberalization cases. The wage increases primarily occur from the EPZ sector's output volume increases and from the skilled labor demand in the CON sector. However, in the European Union and the full unilateral tariff liberalization cases, the increases in the Export Processing Zone Manufacturing, Electricity, Gas, and Water, and the Construction sectors' skilled labor demand increases are not enough to increase the skilled labor wage with the decreases in the skilled labor demand that take place in the Other Services sector mainly, but occurs in all the other sectors in the economy. The unskilled labor wage increases across all tariff liberalization cases. The increases are mainly driven by the output volume

increases in the Export Processing Zone Manufacturing sector for each tariff liberalization case and only intermittently by the marginal unskilled labor increase in the Construction sector.

The rental rate of capital increases as well, but decreases in the full unilateral tariff liberalization case with value-added replacement. The Export Processing Zone Manufacturing sector's output increase is the reason for the increase in the rental rate of capital. But in the full unilateral tariff liberalization case with value-added tax replacement, the weight of the capital demand decreases in the sectors that are capital intensive and have a high value-added tax levy, namely the Other Agriculture, Sugar Milling, Other Manufacturing, Electricity, Gas, and Water sectors and the Other Services sectors, exceed the upward pressure on the rental rate of capital by the EPZ sector. The percentage change of the ratio of factor prices reflect how the unskilled laborer is always better off than skilled laborers, but only outperform the capitalist in the European Union and full unilateral tariff liberalization cases. Hence, with dual preferential price removals and unilateral tariff liberalization with the European Union, Southern African Customs Union, the United States and the Southern African Customs Union, as well as the with all of Mauritius' trade constituents, yields even greater welfare declines than in the pure EU-U.S. case alone, and thus are not the proper policies to implement to counteract the negative welfare changes from the dual price cut.

5.2 FUTURE RESEARCH

Several extensions can be made to the analytical scope of this study. One extension that can be adopted is to explicitly model reciprocal access to other markets with tariff liberalization. This policy change can be implemented by increasing the export price of goods and services

flowing to a particular region to reflect the increased access to that region's market. Thus, the reciprocity of trade effects can be implemented and explicitly accounted for, modeling the implementation of a free trade area with a region.

Second, the results of the model without the domestic tax policy changes can be assessed. Without implementing the counterfactual case, where tariff rate changes from 1997-2000 and the introduction of the value-added tax is modeled, the results may differ given the decreases in output and export quantities in the Sugar Milling sector occur before any simulations are run. Thus, the 1997 economy can be presented and subsequent trade policy changes can be run from the initial benchmark economy to further isolate the effects of preferential sugar export price removal and the tariff liberalization reforms.

Third, using the piecemeal approach to tariff liberalization can be another policy choice to be studied. In particular, allowing only certain sectors to be liberalized rather than all of them as regions are liberalized may or may not yield welfare-improvements. The piecemeal approach may soften the welfare declines, if not reverse them altogether. Thus, protecting the sectors that are most adversely affected by tariff liberalizations may increase overall welfare in Mauritius and warrant further study.

Lastly, the value-added tax uniformity can be explicitly modeled. Application of the official rate to all sectors would be simulated rather than the calculated rate being applied, which accounts for value-added tax exemptions. This would present to Mauritius the welfare effects of removing a distortionary tax and replacing it with a non-distortionary tax. Given the theory of the second best, this policy may or may not increase welfare, and is a question that must be addressed quantitatively. Thus, the value-added tax being implemented as a non-distortionary tax is a quantitative issue that Mauritius can address to possibly increase its economic welfare.

5.3 POLICY RECOMMENDATIONS

In light of the preferential sugar export price removal by the European Union, the United States, or both the European Union and the United States jointly, Mauritius can adopt trade policy changes to counteract the negative welfare effects suffered from the loss of its inflated sugar export prices. However, unilateral tariff liberalization with the European Union, the Southern African Customs Union, the United States and the Southern African Customs Union, and with all of its trade constituents deems unfruitful, producing welfare declines in the range of [-0.10%, -0.81%], with the largest decrease occurring in the full tariff liberalization with value-added tax replacement case.

One possible line of defense is to perform bilateral free trade area simulations to witness whether or not they increase welfare with preferential price removal (i.e. bilateral tariff liberalization for the EU, SACU, U.S.-SACU, and with all of Mauritius' trade partners). Furthermore, other regional groupings may be considered to find the optimal mixture of regions with which to engage in tariff liberalization (i.e. tariff liberalization with the EU-U.S., EU-SACU, EU-SACU-U.S., etc.) to establish whether or not they are welfare-improving when combined with the loss of preferential pricing. With the alternative regional groupings, both unilateral and bilateral tariff liberalization could be implemented and analyzed, to capture which reform or set of reforms are welfare-improving. Lastly, diversification of the economy through the promotion of activities outside of the sugar industry's exploits may be a line of defense in the preferential pricing removal, in that tourism, offshore banking, insurance, etc., could boost the overall welfare of the economy if sectors such as the Restaurants and Hotels and the Other Services sectors have a higher marginal productivity than what currently exists in the Sugar Milling sector.

APPENDIX A

1997 SUPPLY AND USE TABLE

Table 41: 1997 Supply and Use Tables 5.1 and 5.2

Table 5.1- Supply Table, 1997

Rs 000

	Products	Total supply at purchasers' prices	Trade margin
1	Products of agriculture, horticulture and market gardening except sugar cane	3,982,887	352,435
2	Sugar cane	5,885,000	0
3	Live animals and animal products	1,852,911	49,342
4	Forestry and logging products	220,292	13,390
5	Fish and other fishing products	1,562,980	7,803
6	Coal and lignite; peat	38,539	0
7	Crude petroleum and natural gas	25,975	0
8	Metal ores	334	0
9	Stone, sand and clay	965,112	0
10	Other minerals	653,275	6,041
11	Meat, fish, fruit, vegetables, oils and fats	7,399,847	434,318
12	Dairy products	1,426,685	158,103
13	Grain mills products, starches and starch products; other food products except sugar	4,615,503	142,799
14	Sugar	8,995,052	56,978
15	Beverages	3,425,072	68,528
16	Tobacco products	1,489,112	6,818
17	Yarn and thread; woven and tufted textile fabrics	12,299,367	448,764
18	Textile articles other than apparel	1,215,115	244,354
19	Knitted or crocheted fabrics; wearing apparel	22,292,850	274,506
20	Leather and leather products; footwear	850,094	89,573
21	Products of wood, cork, straw and plaiting materials	942,950	31,800
22	Pulp, paper and paper products; printed matter and related articles	3,337,264	15,964
23	Coke oven products; refined petroleum products; nuclear fuel	4,976,373	484,234
24	Basic chemicals	2,771,406	116,105
25	Other chemical products; man-made fibres	3,744,159	118,999
26	Rubber and plastic products	2,318,997	77,245
27	Glass and glass products and other non-metallic products n.e.c.	2,133,725	115,873
28	Furniture; other transportable goods n.e.c	3,212,393	365,605
29	Waste or scraps	57,589	4,189
30	Basic metals	3,003,738	133,569
31	Fabricated metal products, except machinery and equipment	1,906,686	68,871
32	General purpose machinery	1,977,851	203,969
33	Special purpose machinery	3,741,910	490,566
34	Office, accounting and computing machinery	792,686	104,706
35	Electrical machinery and apparatus	2,056,513	260,959
36	Radio, television and communication equipment and apparatus	2,485,772	145,819
37	Medical appliances, precision and optical instruments, watches and clocks	1,722,111	166,584
38	Transport equipment	8,833,689	1,160,663
39	Constructions	12,076,700	0
40	Wholesale trade services	0	-3,421,497
41	Retail trade services	0	-2,997,976
42	Lodging; food and beverages serving services	9,048,567	0
43	Land, supporting and auxilliary transport services	5,491,694	0
44	Water transport services	2,456,898	0
45	Air transport services	8,906,362	0
46	Postal and courier services	249,048	0
47	Electricity distribution service; gas and water distribution services through mains	3,111,400	0
48	Financial intermediation, insurance, leasing and auxiliary services	8,414,086	0
49	Real estate services	4,549,800	0
50	Research and development services	196,630	0
51	Professional, scientific and technical services	2,736,191	0
52	Other professional, scientific and technical services	4,851,677	0
53	Telecommunications services; information retrieval and supply services	4,068,501	0
54	Support services	888,880	0
55	Maintenance and repair services	7,047,673	0
56	Public administration and other services to the community as a whole; compulsory social security services	6,926,859	0
57	Education services	3,633,520	0
58	Health and social services	2,632,239	0
59	Sewage and refuse disposal, sanitation and other environmental protection services	583,232	0
60	Services of membership organisations	368,070	0
61	Recreational, cultural, sporting and other services	3,271,756	0
62	Cif/fob adjustment	0	0
	Total	**220,721,598**	**0**

Appendix A (continued)

Table 5.1 cont'd - Supply Table, 1997

Rs 000

Product	Transport margin	Taxes on products	Subsidies on products	Total supply at basic prices	Agriculture, hunting, forestry and fishing				
					Sugar cane	Foodcrops	Fishing	Other agriculture	
								General Government	Other
1	33,540	86,234	-101,900	3,580,578	0	1,344,544	0	0	0
2	0	0	0	5,885,000	5,885,000	0	0	0	0
3	4,156	5,599	0	1,793,814	0	0	0	0	1,516,753
4	1,063	12,113	0	193,726	0	0	0	0	122,848
5	699	5,321	0	1,549,157	0	0	429,900	0	0
6	468	6,853	0	31,218	0	0	0	0	0
7	0	5,756	0	20,219	0	0	0	0	0
8	0	60	0	274	0	0	0	0	0
9	0	4,977	0	960,135	0	0	0	0	0
10	0	55,463	0	591,771	0	0	0	0	0
11	37,104	204,084	0	6,724,341	0	0	0	0	0
12	14,459	13,890	0	1,240,232	0	0	0	0	0
13	12,862	278,755	-419,600	4,600,688	0	63,889	0	0	0
14	4,524	203,955	0	8,729,595	0	0	0	0	0
15	4,100	139,226	0	3,213,218	0	0	0	0	0
16	0	1,639	0	1,480,655	0	39,466	0	0	0
17	152,792	184	0	11,697,627	0	0	0	0	0
18	13,697	74,453	0	882,611	0	0	0	0	0
19	29,185	229,649	0	21,759,510	0	0	0	0	0
20	6,802	144,946	0	608,773	0	0	0	0	0
21	9,956	120,655	0	780,539	0	0	0	0	0
22	21,870	362,079	0	2,937,351	0	0	0	0	0
23	68,578	967,836	0	3,455,725	0	0	0	0	0
24	33,142	303,981	0	2,318,178	0	0	0	0	0
25	32,140	340,653	0	3,252,368	0	0	0	0	0
26	21,730	572,327	0	1,647,695	0	0	0	0	0
27	30,531	358,968	0	1,628,354	0	0	0	0	0
28	57,822	668,188	0	2,120,779	0	0	0	0	0
29	0	2,318	0	51,082	0	0	0	0	0
30	33,740	350,689	0	2,485,740	0	0	0	0	0
31	59,734	414,513	0	1,363,568	0	0	0	0	0
32	76,273	556,922	0	1,140,687	0	0	0	0	0
33	94,448	481,922	0	2,674,974	0	0	0	0	0
34	18,000	84,281	0	585,699	0	0	0	0	0
35	49,755	525,743	0	1,220,055	0	0	0	0	0
36	27,800	443,939	0	1,868,214	0	0	0	0	0
37	28,515	212,460	0	1,314,552	0	0	0	0	0
38	35,500	1,690,468	0	5,947,057	0	0	0	0	0
39	0	0	-119,000	12,195,700	0	0	0	0	0
40	0	0	0	3,421,497	0	0	0	0	0
41	0	0	0	2,997,976	0	0	0	0	0
42	0	567,000	0	8,481,567	0	0	0	0	0
43	-1,014,985	0	0	6,506,679	0	0	0	0	0
44	0	0	-55,000	2,511,898	0	0	0	0	0
45	0	0	0	8,906,362	0	0	0	0	0
46	0	0	0	249,048	0	0	0	0	0
47	0	0	0	3,111,400	0	0	0	0	0
48	0	0	0	8,414,086	0	0	0	0	0
49	0	0	0	4,549,800	0	0	0	0	0
50	0	0	0	196,630	0	0	0	0	0
51	0	0	0	2,736,191	0	0	0	772,700	0
52	0	0	0	4,851,677	0	0	0	0	0
53	0	0	0	4,068,501	0	0	0	0	0
54	0	0	0	888,880	0	0	0	0	0
55	0	0	0	7,047,673	0	0	0	0	0
56	0	0	0	6,926,859	0	0	0	0	0
57	0	0	-35,500	3,669,020	0	0	0	0	0
58	0	0	0	2,632,239	0	0	0	0	0
59	0	0	0	583,232	0	0	0	0	0
60	0	0	0	368,070	0	0	0	0	0
61	0	648,900	0	2,654,856	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0
Total	**0**	**11,147,000**	**-731,000**	**210,305,598**	**5,885,000**	**1,447,899**	**429,900**	**772,700**	**1,639,601**

Table 5.1 cont'd - Supply Table, 1997

Rs 000

Product	Mining and quarrying	Manufacturing						
		Sugar	Manufacturing- EPZ			Manufacturing- Non-EPZ		
			Manufacture of textile	Manufacture of wearing apparel	Other	Manufacture of beverages and tobacco	Manufacture of food products	Manufacture of textiles
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	1,072,660	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	135,000	0	0	0	0	0	0	0
10	0	0	0	0	0	0	20,289	0
11	0	0	0	0	22,110	77,829	4,150,788	0
12	0	0	0	0	0	0	276,319	0
13	0	0	0	0	300,672	18,472	3,360,180	0
14	0	8,428,000	0	0	0	0	0	0
15	0	0	0	0	0	2,834,098	0	0
16	0	0	0	0	0	1,415,252	0	0
17	0	0	3,206,365	846,330	5,310	0	0	0
18	0	0	41,628	46,568	61,276	0	0	47,859
19	0	0	0	19,126,328	1,925	0	0	148,401
20	0	0	0	14,434	139,412	0	0	0
21	0	0	0	0	57,578	23,741	18,367	0
22	0	0	1,280	0	154,925	0	0	75
23	0	0	0	0	0	0	0	0
24	0	0	125,266	0	0	0	0	0
25	0	0	0	0	162,744	0	0	0
26	0	0	3,615	0	107,125	0	0	0
27	0	0	0	0	2,863	0	0	5,442
28	0	0	0	0	439,596	0	0	0
29	0	0	0	0	0	0	0	0
30	0	0	0	0	6,652	0	0	0
31	0	0	0	0	12,922	0	0	0
32	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0
35	0	0	0	0	6,102	0	0	0
36	0	0	0	0	13,521	0	0	0
37	0	0	0	0	474,493	0	0	0
38	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0
Total	**135,000**	**8,428,000**	**3,378,154**	**20,033,660**	**3,041,886**	**4,369,392**	**7,825,943**	**201,777**

Table 5.1 cont'd - Supply Table, 1997

Rs 000

Product	Manufacturing							
	Manufacturing- Non-EPZ							
	Manufacture of wearing apparel	Manufacture of leather products	Manufacture of wood products	Manufacture of paper and paper products	Publishing and printing	Manufacture of coke and chemical products	Manufacture of rubber and plastic products	Manufacture of Non-metallic mineral products
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	802,863
10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	0	0	0	0	0	2,188	0	0
16	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	390	0
19	365,057	0	0	0	0	0	0	0
20	0	114,812	0	0	0	0	0	0
21	0	0	74,539	0	0	0	0	0
22	0	0	0	308,341	1,370,516	0	0	0
23	0	0	0	0	0	26,818	0	0
24	0	0	0	0	0	535,817	0	0
25	0	0	0	80,875	0	1,401,399	0	347
26	52	30,668	0	0	0	1,794	383,336	16,133
27	0	0	0	0	0	0	0	93,476
28	0	0	167	0	0	0	0	0
29	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	47,669
31	0	0	0	0	0	0	0	1,726
32	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0
35	0	0	0	0	28,955	133,376	9,967	0
36	0	0	0	0	0	0	18,572	0
37	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	28,988	0
39	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0
52	0	0	0	0	2,271	0	0	0
53	0	0	0	0	0	0	0	0
54	0	0	0	0	313	0	0	0
55	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0
Total	**365,109**	**145,480**	**74,706**	**389,216**	**1,402,055**	**2,101,392**	**441,253**	**962,214**

Table 5.1 cont'd - Supply Table, 1997

Rs 000

Product	Manufacturing					Electricity	water	Construction
	Manufacturing- Non-EPZ							General Government
	Manufacture of basic metals and fabricated metal products	Manufacture of machinery and equipment n.e.c	Manufacture of furniture	Other manufacturing				
				General Governemnt	Other			
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0
18	0	0	0	0	21	0	0	0
19	0	0	0	0	137	0	0	0
20	0	0	0	0	0	0	0	0
21	0	0	108,509	0	0	0	0	0
22	0	0	0	0	8,725	0	0	0
23	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
26	18,194	0	0	0	249	0	0	0
27	0	0	0	0	0	0	0	0
28	27,803	0	59,564	0	62,014	0	0	0
29	0	0	0	0	0	0	0	0
30	744,441	0	0	0	0	0	0	0
31	428,832	5,472	505	0	29	0	0	0
32	0	5,512	0	0	0	0	0	0
33	0	154,250	0	0	28,159	0	0	0
34	0	0	0	0	0	0	0	0
35	0	0	0	0	104,847	0	0	0
36	0	0	0	0	192,061	0	0	0
37	0	0	0	0	8,450	0	0	0
38	0	0	0	0	127,761	0	0	0
39	0	0	0	0	0	0	0	293,400
40	0	0	0	0	0	0	0	0
41	0	0	82	0	0	0	0	0
42	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0
47	0	0	0	0	0	2,491,100	620,300	0
48	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0
51	0	0	0	0	0	8,000	0	0
52	0	0	0	53,200	0	0	0	0
53	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0
55	74	0	92	0	7,276	0	0	0
56	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0
61	0	0	0	0	1,202	0	0	0
62	0	0	0	0	0	0	0	0
Total	**1,219,344**	**165,234**	**168,752**	**53,200**	**540,931**	**2,499,100**	**620,300**	**293,400**

Table 5.1 cont'd - Supply Table, 1997

Rs 000

Product	Construction	Wholesale and retail trade and repairs	Hotels and restaurants	Transport, storage and communication			Transport, storage and communication	
	Other			Land transport	Water transport	Air transport	Supporting and auxilliary transport activities	Post and telecommunication
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0
19	0	4	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0
28	0	29	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0
39	11,902,300	0	0	0	0	0	0	0
40	0	3,417,822	3,675	0	0	0	0	0
41	0	2,997,894	0	0	0	0	0	0
42	0	0	6,658,567	0	0	0	0	0
43	0	0	0	1,648,110	0	0	2,876,317	0
44	0	0	0	0	277,029	0	0	0
45	0	0	0	0	0	8,468,362	0	0
46	0	0	0	0	0	0	0	249,048
47	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0
51	0	318,499	253,483	59,906	0	3,094	176,484	1,110
52	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	3,305,828
54	0	0	0	0	0	0	0	0
55	0	6,726,752	3,675	0	133,733	0	68,765	12,714
56	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0
Total	**11,902,300**	**13,461,000**	**6,919,400**	**1,708,016**	**410,762**	**8,471,456**	**3,121,566**	**3,568,700**

Table 5.1 cont'd - Supply Table, 1997

Rs 000

Product	Transport, storage and communication	Financial intermediation		Real estate, renting and business activities			Real estate, renting and business activities	
	Other transport, storage and communication - General Government	Banking and other financial intermediation	Insurance	Real estate		Business activities	Other real estate, renting and business activities	
				Owner occupied dwellings	Other		General Government	Other
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
21	0	0	0	0	0	6	0	0
22	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0
43	230,500	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0
48	0	4,391,000	2,798,000	0	0	0	0	341,507
49	0	62,000	0	4,379,400	0	0	108,400	0
50	0	0	0	0	0	196,630	0	0
51	0	0	0	0	20,117	1,063,791	0	25,310
52	0	0	0	0	0	981,206	0	0
53	0	0	0	0	0	762,673	0	0
54	0	0	0	0	0	888,567	0	0
55	0	0	0	0	6,165	34,069	0	0
56	0	0	0	0	0	0	0	40,559
57	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0
Total	**230,500**	**4,453,000**	**2,798,000**	**4,379,400**	**26,282**	**3,926,942**	**108,400**	**407,376**

Table 5.1 cont'd - Supply Table, 1997

Rs 000

Product	Public administration and defence	Education		Health and social work		Other services	Other services	
		General government	Other	General government	Other	Activities of membership organisations	Recreational, cultural and sporting activities	Other
								General government
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0
37	0	0	0	0	3,311	0	0	0
38	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	19	0
49	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0
51	0	0	380	0	8,750	1,741	22,633	0
52	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	53,971	0
56	6,886,300	0	0	0	0	0	0	0
57	0	2,018,500	1,650,520	0	0	0	0	0
58	0	0	0	1,803,200	829,039	0	0	0
59	0	0	0	0	0	0	0	0
60	0	0	0	0	0	204,470	0	163,600
61	0	0	0	0	0	0	2,432,549	0
62	0	0	0	0	0	0	0	0
Total	**6,886,300**	**2,018,500**	**1,650,900**	**1,803,200**	**841,100**	**206,211**	**2,509,172**	**163,600**

Table 5.1 cont'd - Supply Table, 1997

Rs 000

Product	Other services		Gross output of all industries at basic prices	C.I.f/f.o.b adjustment	Imports	
		Other			Goods	Services[1]
1	0		1,344,544	0	2,236,034	0
2	0		5,885,000	0	0	0
3	0		1,516,753	0	277,061	0
4	0		122,848	0	70,878	0
5	0		1,502,560	0	46,597	0
6	0		0	0	31,218	0
7	0		0	0	20,219	0
8	0		0	0	274	0
9	0		937,863	0	22,272	0
10	0		20,289	0	571,482	0
11	0		4,250,727	0	2,473,614	0
12	0		276,319	0	963,913	0
13	0		3,743,213	0	857,475	0
14	0		8,428,000	0	301,595	0
15	0		2,836,286	0	275,934	100,998
16	0		1,454,718	0	25,937	0
17	0		4,058,005	0	7,639,622	0
18	0		197,742	0	684,869	0
19	0		19,641,852	0	1,459,258	658,400
20	0		268,658	0	340,115	0
21	0		282,740	0	497,800	0
22	0		1,843,862	0	1,093,489	0
23	0		26,818	0	3,428,907	0
24	0		661,083	0	1,657,095	0
25	0		1,645,365	0	1,607,003	0
26	0		561,166	0	1,086,529	0
27	0		101,781	0	1,526,573	0
28	0		589,173	0	1,531,606	0
29	0		0	0	51,082	0
30	0		798,762	0	1,686,978	0
31	0		449,486	0	914,082	0
32	0		5,512	0	1,135,175	0
33	0		182,409	0	2,492,565	0
34	0		0	0	585,699	0
35	0		283,247	0	936,808	0
36	0		224,154	0	945,058	699,002
37	0		486,254	0	828,298	0
38	0		156,749	0	5,790,308	0
39	0		12,195,700	0	0	0
40	0		3,421,497	0	0	0
41	0		2,997,976	0	0	0
42	0		6,658,567	0	0	1,823,000
43	0		4,754,927	-331,848	0	2,083,600
44	0		277,029	-776,131	0	3,011,000
45	0		8,468,362	0	0	438,000
46	0		249,048	0	0	0
47	0		3,111,400	0	0	0
48	0		7,530,526	-307,440	0	1,191,000
49	0		4,549,800	0	0	0
50	0		196,630	0	0	0
51	193		2,736,191	0	0	0
52	0		1,036,677	0	0	3,815,000
53	0		4,068,501	0	0	0
54	0		888,880	0	0	0
55	387		7,047,673	0	0	0
56	0		6,926,859	0	0	0
57	0		3,669,020	0	0	0
58	0		2,632,239	0	0	0
59	583,232		583,232	0	0	0
60	0		368,070	0	0	0
61	221,105		2,654,856	0	0	0
62	0		0	1,415,419	-1,415,419	0
Total	**804,917**		**151,807,598**	**0**	**44,678,000**	**13,820,000**

[1]Direct purchases of goods abroad by residents are shown in this column

Table 5.2- Use Table, 1997

Rs 000

Product	Total supply at purchasers' prices	Agiculture, hunting, forestry and fishing					Mining and quarrying	Manufacturing	
		Sugar cane	Foodcrops	Fishing	Other agriculture			Sugar	Manufacturing-EPZ
					General Government	Other			Manufacture of textiles
1	3,982,887	0	66,498	0	0	654,501	0	0	0
2	5,885,000	0	0	0	0	0	0	5,885,000	0
3	1,852,911	0	16,526	0	0	12,536	0	0	0
4	220,292	0	0	0	0	0	0	0	0
5	1,562,980	0	0	0	0	0	0	0	0
6	38,539	0	0	0	0	0	0	0	0
7	25,975	24,800	4,984	0	0	0	0	17,600	0
8	334	0	0	0	0	0	0	0	0
9	965,112	24,300	0	0	0	0	0	13,900	0
10	653,275	0	0	0	0	2,597	0	0	0
11	7,399,847	0	0	0	0	18,043	0	0	0
12	1,426,685	0	0	0	0	0	0	0	0
13	4,615,503	0	0	0	0	7,264	0	35	0
14	8,995,052	0	0	0	0	0	0	0	0
15	3,425,072	15,500	0	0	0	0	0	0	0
16	1,489,112	0	0	0	0	0	0	0	0
17	12,299,367	0	0	0	0	0	5,000	0	1,881,474
18	1,215,115	0	0	0	0	0	0	0	27,780
19	22,292,850	0	0	0	16,222	0	0	0	0
20	850,094	0	0	0	0	0	0	0	0
21	942,950	0	0	0	0	0	5,000	0	2,471
22	3,337,264	7,800	0	0	58,143	469	0	2,500	0
23	4,976,373	0	0	0	0	0	6,996	19	0
24	2,771,406	550,200	101,257	0	0	0	0	53,400	510,944
25	3,744,159	13,500	393	0	0	10,895	0	0	34,384
26	2,318,997	2,400	393	0	0	0	0	35	0
27	2,133,725	0	0	0	0	0	0	0	0
28	3,212,393	0	0	0	0	0	0	0	0
29	57,589	0	0	0	0	3,046	0	0	0
30	3,003,738	0	0	133,600	0	0	0	0	0
31	1,906,686	5,400	3,278	0	0	0	0	7,700	0
32	1,977,851	0	0	0	0	0	0	0	0
33	3,741,910	0	0	0	0	0	0	170,000	0
34	792,686	0	0	0	0	0	0	0	0
35	2,056,513	0	0	0	0	0	0	0	0
36	2,485,772	0	0	0	0	0	0	0	0
37	1,722,111	0	0	0	3,319	0	0	0	0
38	8,833,689	0	0	0	0	0	0	0	0
39	12,076,700	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0
42	9,048,567	0	0	0	0	0	0	0	0
43	5,491,694	642,400	21,379	0	5,174	25,190	0	283,500	0
44	2,456,898	0	0	0	0	0	0	0	0
45	8,906,362	0	0	0	0	0	0	0	0
46	249,048	0	0	0	0	0	0	0	0
47	3,111,400	0	1,836	0	3,692	24,623	0	1	0
48	8,414,086	43,400	0	0	0	0	0	55,801	0
49	4,549,800	0	0	0	19	1,172	0	0	0
50	196,630	0	0	0	1,918	0	0	0	0
51	2,736,191	25,400	0	0	505	1,172	0	22,400	0
52	4,851,677	233,500	0	0	0	0	0	93,100	0
53	4,068,501	59,800	0	0	2,188	2,695	0	575,100	0
54	888,880	0	656	0	5,901	0	0	0	0
55	7,047,673	34,100	0	0	9,928	27,064	3	909	0
56	6,926,859	0	0	0	0	0	0	0	0
57	3,633,520	0	0	0	945	0	0	0	0
58	2,632,239	0	0	0	0	1,386	0	0	0
59	583,232	0	0	0	193	0	0	0	0
60	368,070	24,500	0	0	0	0	0	0	0
61	3,271,756	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0
Total	**220,721,598**	**1,707,000**	**217,200**	**133,600**	**108,147**	**792,653**	**17,000**	**7,180,999**	**2,457,053**

Table 5.2 cont'd- Use Table, 1997

Rs 000

Product	Manufacturing							
	Manufacturing- EPZ		Manufacturing- Non- EPZ					
	Manufacture of wearing apparel	Other	Manufacture of beverages and tobacco	Manufacture of food products	Manufacture of textiles	Manufacture of wearing apparel	Manuafcture of leather products	Manufacture of wood and wood products
1	0	13,623	473,329	1,651,883	0	786	23	0
2	0	0	0	0	0	0	0	0
3	0	23,003	0	225,920	0	0	405	0
4	0	0	28,688	31,320	0	8,245	7,310	471
5	0	756,461	0	58,774	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	404	0	0	0	0	0	0
10	0	2,199	0	20,093	0	0	0	0
11	52,145	43,894	0	1,334,295	0	0	0	0
12	99,100	158	0	81,356	0	0	0	0
13	486	3,351	91,787	375,745	0	9	0	21
14	0	15,010	134,898	29,098	0	0	0	0
15	11,397	0	286,837	0	0	0	0	0
16	0	0	0	0	0	0	0	0
17	9,661,598	78,177	0	35,030	85,121	260,399	3,605	11
18	1,302,535	71,021	0	0	31,292	22,123	0	14
19	47,025	2,174	0	0	0	73	0	0
20	17,572	49,249	0	0	0	0	55,224	0
21	15,429	34,021	7,529	73,171	0	0	0	54,610
22	6,957	95,561	843	19,806	100	1,381	51	79
23	0	26	3	715	0	59	31	107
24	871,225	203,632	436	0	0	0	7,495	6,932
25	7,867	48,163	0	1,270	24,415	5	9,041	27
26	41,391	67,777	281,966	277,846	5,783	5,999	8,770	0
27	0	75,490	18,588	572	0	0	0	14
28	11,794	12,346	0	0	0	7,513	14	55
29	0	37	0	0	0	0	0	0
30	0	55,068	100,673	0	0	0	837	14
31	3,743	246,394	27,959	14,443	15,269	841	25	10
32	0	0	0	0	0	0	0	0
33	69,566	0	28,682	11,932	171	11,226	3,307	0
34	0	0	0	0	0	0	0	0
35	15,743	474	0	0	0	0	0	0
36	31,486	121,045	0	0	0	0	0	0
37	31,486	12,085	0	0	0	0	0	0
38	15,743	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0
45	400,000	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0
47	0	0	1	428	0	105	24	118
48	15,743	0	8	108	2	36	20	208
49	0	0	0	149	15	247	73	94
50	0	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0
55	0	0	0	161	0	91	5	142
56	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0
61	47,474	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0
Total	**12,777,505**	**2,030,843**	**1,482,227**	**4,244,115**	**162,168**	**319,138**	**96,261**	**62,928**

Table 5.2 cont'd- Use Table, 1997

Rs 000

Product	Manufacturing							
	Manufacturing- Non- EPZ							
	manufacture of paper and paper products	Publishing and printing	Manufacture of coke and chemical products	Manufacture of rubber and plastic products	Manufacture of non-metallic mineral products	Manufacture of basic and fabicated mineral products	Manufacture of machinery and equipment	Manufacture of furniture
1	0	0	18,632	27,095	5,524	266,482	4,811	5,208
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	28,362	0
4	246,413	359,300	36,115	3,939	732	15,059	10,951	46
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	284,158	0	0	0
10	0	0	0	0	8	0	0	0
11	0	0	25,405	0	0	27,145	3,068	13,689
12	0	0	3,387	0	180,497	0	0	0
13	0	10	1,718	0	23,610	2	0	0
14	0	0	339	0	0	0	0	0
15	0	0	18,969	118	0	0	0	0
16	0	0	0	0	0	0	0	0
17	0	2	0	5,688	0	0	0	147
18	0	0	0	5,404	0	28	0	622
19	0	0	0	0	0	0	0	0
20	0	0	0	0	0	5,317	0	10,716
21	9,557	6	3,726	548	47	5,342	0	102,185
22	32,492	486,180	24,600	20	1,387	340	0	63
23	0	62	16,997	22	50	119	0	80
24	337	12	11,866	112,295	3,041	17,602	5,811	4
25	2,624	78,560	230,260	13,448	9,497	779	0	28,044
26	16,768	9,183	121,122	125,131	77	13,955	223	3,264
27	0	0	10,075	200	271,971	8,965	0	55
28	0	22	0	0	193	0	0	15,044
29	0	0	0	0	23,242	0	0	0
30	0	6	17	4	10,390	1,507,539	13,664	52,816
31	0	6	31,859	30,015	5,500	28,073	3,357	10,873
32	0	0	0	0	0	0	3,801	0
33	0	47,555	17,187	8,539	23,040	36,865	39,315	539
34	0	0	0	0	0	0	0	0
35	0	0	0	0	97	9	0	4
36	0	0	0	0	0	0	0	0
37	0	98	0	0	0	0	0	0
38	0	0	0	0	0	2	0	0
39	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0
47	0	92	4	116	124	71	0	123
48	0	4,219	3	12	82	80	0	148
49	0	128	12	36	0	30	0	114
50	0	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0
55	0	70	0	30	57	76	0	34
56	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0
Total	**308,191**	**985,512**	**572,293**	**332,660**	**843,324**	**1,933,880**	**113,363**	**243,818**

Table 5.2 cont'd- Use Table, 1997

Rs 000

Product	Manufacturing	Electricity	Water	Construction		Wholesale and retail trade and repairs	Hotels and restaurants	Transport, storage and communication	
	Manufacturing- Non- EPZ			General Government	Other			Land transport	Water transport
	Other								
1	121,791	0	0	0	0	55	182	0	0
2	0	0	0	0	0	0	0	0	0
3	174,226	0	0	0	0	0	15	0	0
4	8	26,213	0	0	0	1,374	2,557	0	0
5	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0
7	0	0	0	0	580	2,260	20,238	74	0
8	0	0	0	0	0	0	0	0	0
9	85	0	17,808	0	1,166,783	0	0	0	0
10	3	0	0	0	0	0	1	0	0
11	0	0	0	0	0	3	285	0	0
12	0	0	0	0	0	0	15	0	0
13	0	0	0	0	0	215	314	0	0
14	0	0	0	0	0	0	2	0	0
15	0	0	0	0	0	0	103,727	0	257
16	0	0	0	0	0	0	9,348	0	0
17	8,747	0	0	0	0	3	3	0	0
18	17	0	0	0	0	3,148	35,287	0	0
19	2	0	1,811	7,764	0	0	0	2,078	0
20	0	0	0	0	0	2	0	0	0
21	33	0	0	0	0	23	0	0	0
22	1,201	0	409	958	2	33,491	33,086	4,183	11,623
23	538	1,138,599	7,400	0	553,117	94,719	12,467	132,704	13,400
24	27	0	0	0	0	706	0	0	0
25	4,782	0	0	0	1	8,037	32,105	3,096	0
26	23,049	0	0	0	0	12,017	3	18,916	0
27	3,242	0	0	0	1,214,479	10	0	0	0
28	30,497	0	0	0	0	2	0	0	0
29	0	0	0	0	0	0	0	0	0
30	134,671	0	890	0	1,587,215	243	0	0	0
31	8,280	0	0	0	291,239	192	40,432	0	0
32	0	0	0	0	0	3,046	0	0	0
33	174,226	0	0	0	0	192	0	0	0
34	13	0	2,799	0	0	54	0	636	0
35	9,271	0	0	0	75,598	523	0	888	0
36	34,382	0	0	0	0	12,552	0	0	0
37	10,375	0	0	0	0	9	0	0	0
38	43,986	0	0	0	0	1,231	0	54,978	6,046
39	0	0	0	0	1,741,780	0	0	0	0
40	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	391,553	0	0
43	0	0	0	2,028	151	73,435	852	427	0
44	0	174,399	23,717	7,098	52,101	890,259	530,646	0	9,337
45	0	72,014	55,303	0	0	337,760	29,973	77,768	41,472
46	0	0	0	0	0	0	0	0	0
47	58	179,775	64,532	1,616	42,110	86,591	130,340	3,423	148
48	47	0	630	0	683,598	77,302	18,575	27,941	666
49	118	814	1,500	1,452	24,209	172,808	47,394	1,627	1,258
50	0	0	0	0	0	0	0	0	0
51	0	24,884	28,200	0	28,021	126,475	130,078	11,022	27,443
52	0	0	0	0	12,655	0	0	0	0
53	0	10,559	7,528	1,033	33,498	106,120	46,376	2,720	960
54	0	0	0	4,601	18,905	0	0	0	0
55	17,332	3,339	15,918	3,634	112,468	878,408	263,845	29,047	709
56	0	0	0	0	0	0	0	0	0
57	0	2,839	820	505	6,302	15,965	13,417	470	222
58	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0
61	1,393	0	0	0	0	191,067	1,015,183	86,145	0
62	0	0	0	0	0	0	0	0	0
Total	**802,401**	**1,633,435**	**229,265**	**30,689**	**7,644,811**	**3,130,300**	**2,908,300**	**458,143**	**113,541**

Table 5.2 cont'd- Use Table, 1997

Rs 000

Product	Transport, storage and communication				Financial intermediation		Real estate, renting and business activities	
	Air transport	Supporting and auxilliary transport activities	Post and telecommunication	Other transport, storage and communication- General Government	Banking and other financial intermediation	Insurance	Real estate	
							Owner occupied dwellings	Other real estate
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	888	372	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	222	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0
19	0	4,868	1,067	1,654	7,552	1,943	0	0
20	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0
22	197,395	8,596	14,576	1,614	1,325	634	0	242
23	802,816	28,676	11,098	0	15	35	0	44
24	0	0	0	0	0	0	0	0
25	3,200	347	527	0	4	1	0	5
26	350	2	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0
28	53,369	32	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0
34	0	743	0	0	0	3	0	3
35	53,369	0	0	0	0	0	0	0
36	53,369	0	20,331	0	0	0	0	0
37	0	0	0	0	0	0	0	0
38	533,692	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0
42	1,068,362	0	0	0	2,345	4,197	0	0
43	444,752	7,799	1,263	290	257	6,036	0	0
44	61,582	351,250	0	0	0	0	0	0
45	0	5,367	663,193	20,721	146,174	81,733	0	0
46	0	0	0	0	0	0	0	0
47	7,082	19,060	26,269	6,498	40,683	8,272	0	183
48	627,718	23,739	28,598	0	137,507	800,365	0	114
49	14,295	23,476	9,362	902	414,493	18,175	0	948
50	0	0	0	0	0	0	0	0
51	1,225,536	82,034	355,122	0	62,726	23,281	0	2,058
52	0	0	0	0	34,083	13,051	0	0
53	71,393	25,483	37,592	4,155	104,937	15,050	0	457
54	0	0	0	3,522	60,551	20,453	0	0
55	652,547	97,562	82,533	1,872	7,152	7,033	600,000	422
56	0	0	0	0	0	0	0	0
57	79,021	5,439	3,574	1,072	10,510	6,626	0	13
58	931	0	0	0	0	0	0	0
59	0	0	0	0	3,687	1,113	0	0
60	0	0	0	0	0	0	0	0
61	0	34,523	43,754	0	0	0	0	4,192
62	0	0	0	0	0	0	0	0
Total	**5,950,779**	**720,106**	**1,299,231**	**42,300**	**1,034,000**	**1,008,000**	**600,000**	**8,681**

Table 5.2 cont'd- Use Table, 1997

Rs 000

Product	Real estate, renting and business activities			Public administration and defence	Education		Health and social work	
	Business activities	Other real estate, renting and business activities			General government	Other	General government	Other
		General Government	Other					
1	54	0	0	0	0	6	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	180	0	12	0	0	242	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	121	0	1,528
8	0	0	0	0	0	0	0	0
9	320	0	0	0	0	0	0	0
10	109,924	0	0	0	0	5,051	0	0
11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	2	0	0
13	0	0	0	23,750	0	199	0	34
14	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
17	0	0	0	0	0	1	0	0
18	4,061	0	0	0	0	2	2,243	0
19	4,030	47	0	103,381	1,562	25	24,466	293
20	0	0	0	0	0	0	0	0
21	1	0	3	0	0	1	0	0
22	234,979	63,457	8,318	114,009	28,406	14,711	11,137	1,211
23	21,354	0	26,964	0	0	2,226	0	2,003
24	73	0	0	0	0	3,240	0	0
25	3,590	0	2,197	9,819	0	771	231,232	22,424
26	16	0	547	0	0	2	0	2
27	1	0	0	0	0	0	0	0
28	98	0	0	0	0	1,561	0	53
29	0	0	0	0	0	0	0	0
30	4	0	677	0	0	132	0	0
31	723	0	0	0	0	59	0	680
32	0	0	0	0	0	0	0	0
33	0	0	0	3,252	0	0	0	204
34	965	0	7	0	0	614	0	0
35	12	0	0	0	0	28	0	0
36	948	0	858	0	0	6	0	0
37	76	0	0	2,637	0	24	42,051	2,275
38	0	0	4	0	0	82	0	0
39	0	0	0	32,130	0	0	0	0
40	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0
42	549	0	0	78,139	0	922	0	10,240
43	9,819	136	0	35,263	10,419	62	9,130	0
44	0	0	0	279,577	0	0	0	0
45	230,277	0	48,182	0	0	76,793	0	11,723
46	0	0	0	469	0	0	0	0
47	16,784	326	661	85,408	18,531	6,839	14,344	8,817
48	11,994	0	850	17,374	0	1,137	0	556
49	56,957	0	1,983	160,898	154	14,779	6,152	2,677
50	0	0	0	1,085	0	0	0	0
51	67,123	0	6,622	7,631	26,057	10,181	450	5,654
52	0	515	0	5,677	4,076	0	0	0
53	41,722	2,819	1,478	72,996	33,300	5,811	9,608	6,101
54	0	444	0	110,849	26,138	0	11,996	0
55	248,126	2,378	18,163	305,315	3,880	20,088	1,133	13,000
56	0	0	0	1,666	0	0	0	0
57	16,583	178	160	49,592	32,471	3,250	1,901	486
58	0	0	0	763	0	0	194	0
59	0	0	0	121,762	0	0	0	0
60	0	0	0	0	0	0	0	0
61	108,384	0	6,506	8,158	0	29,638	15,666	68,935
62	0	0	0	0	0	0	0	0
Total	**1,189,727**	**70,300**	**124,192**	**1,631,600**	**184,994**	**198,606**	**381,703**	**158,897**

Table 5.2 cont'd- Use Table, 1997

Rs 000

Product	Other services				Financial Intermediation Services Indirectly Measured (FISIM)	Total intermediate consumption of all industries at purchasers' prices	Exports goods	
	Activities of membership organisations	Recreational, cultural and sporting activities	Other services				Goods	Services[1]
			General Government	Other				
1	0	29	0	0	0	3,310,513	164,853	0
2	0	0	0	0	0	5,885,000	0	0
3	0	0	0	0	0	480,993	134,723	0
4	0	0	0	6,851	0	787,288	3,295	0
5	0	0	0	0	0	815,235	12,270	0
6	0	0	0	0	0	0	0	0
7	0	496	0	794	0	73,697	402	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	1,507,758	35	0
10	0	1	0	0	0	139,877	45,992	0
11	0	3	0	0	0	1,517,975	1,532,149	0
12	0	0	0	0	0	364,515	3,955	0
13	0	7	0	0	0	528,557	362,863	0
14	0	0	0	0	0	179,347	7,597,182	0
15	435	86,480	0	0	0	523,720	20,926	0
16	0	0	0	0	0	9,348	8	0
17	0	0	0	1	0	12,025,007	1,198,779	0
18	0	447	0	0	0	1,506,025	119,412	0
19	60	1,842	1,979	524	0	232,979	20,455,304	377,550
20	0	0	0	0	0	138,080	271,711	377,550
21	0	0	0	0	0	313,704	36,024	70,050
22	18,535	3,194	4,419	3,161	0	1,564,585	140,118	0
23	7,924	8,038	0	15,915	0	2,905,338	211,573	0
24	0	0	0	1	0	2,460,537	152,921	0
25	63	38	0	12,395	0	847,808	42,727	0
26	0	240	0	73	0	1,037,299	88,077	0
27	0	0	0	0	0	1,603,663	163,463	0
28	0	51	0	2	0	132,646	1,283,497	400,550
29	0	0	0	0	0	26,325	96,780	0
30	0	0	0	0	0	3,598,461	23,885	0
31	0	10	0	4	0	776,365	48,300	0
32	0	0	0	0	0	6,847	106,297	0
33	0	0	0	0	0	645,798	132,983	0
34	0	0	0	0	0	5,838	14,991	0
35	0	0	0	0	0	156,017	27,147	0
36	0	83,277	0	0	0	358,254	38,913	593,125
37	0	0	0	0	0	104,436	701,888	0
38	0	0	0	0	0	655,764	143,558	0
39	0	0	0	0	0	1,773,910	0	0
40	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0
42	815	3,776	0	0	0	1,560,898	0	6,336,255
43	2,279	0	553	0	0	1,582,775	0	1,447,800
44	0	50,987	0	0	0	2,434,898	0	22,000
45	10,740	52,398	0	706	0	2,362,297	0	3,962,000
46	0	0	0	0	0	469	0	0
47	1,255	20,462	835	38,842	0	862,009	0	0
48	1,014	17,158	0	9,194	2,605,000	5,210,947	0	2,000
49	4,645	12,725	2,485	2,168	0	1,000,807	0	0
50	0	0	0	0	0	3,003	0	0
51	2,368	21,547	0	5,163	0	2,329,153	0	0
52	0	0	0	0	0	396,657	0	4,230,000
53	2,162	12,813	534	5,339	0	1,302,906	0	0
54	0	0	672	0	0	266,301	0	0
55	6,270	109,935	1,543	15,605	0	3,591,978	0	0
56	0	0	0	0	0	1,666	0	94,000
57	153	590	18	359	0	253,481	0	0
58	0	0	0	0	0	3,274	0	0
59	0	0	3,213	0	0	129,968	0	0
60	0	0	0	0	0	24,500	0	0
61	6,143	137,213	0	2,931	0	1,807,305	0	905,120
62	0	0	0	0	0	0	0	0
Total	**64,861**	**623,759**	**16,251**	**120,029**	**2,605,000**	**74,124,801**	**35,377,000**	**18,818,000**

[1] **Purchasers of goods by non-residents in the domestic economy is shown in this column**

Table 5.2 cont'd- Use Table, 1997

Rs 000

Product	Final Consumption Expenditure		Change in inventories[2]
	General Government	Household	
1	0	2,290,404	-1,814,882
2	0	0	0
3	0	1,360,468	-123,273
4	0	0	-570,290
5	0	770,111	-34,636
6	0	0	38,539
7	0	0	-48,124
8	0	0	334
9	0	0	-542,681
10	0	12,158	455,249
11	0	4,047,712	302,011
12	0	1,224,716	-166,502
13	0	1,822,362	1,901,721
14	0	542,590	675,933
15	0	686,685	2,193,741
16	0	413,636	1,066,120
17	0	1,033,223	-1,957,642
18	0	165,989	-576,312
19	0	1,002,271	224,746
20	0	61,569	1,184
21	0	0	523,173
22	0	838,272	794,289
23	0	2,220,910	-361,448
24	0	0	157,948
25	0	2,385,212	468,413
26	0	1,017,726	175,894
27	0	441,415	-74,816
28	0	816,409	-384,416
29	0	0	-65,516
30	0	6,268	-624,877
31	0	21,189	65,260
32	0	356,957	236,531
33	0	1,122,233	266,761
34	0	237,317	234,541
35	0	1,071,647	-27,554
36	0	1,495,610	-463,471
37	0	157,854	282,687
38	0	1,600,471	128,162
39	0	0	0
40	0	0	0
41	0	0	0
42	0	1,151,414	0
43	230,500	2,230,619	0
44	0	0	0
45	0	2,582,065	0
46	0	248,579	0
47	0	2,249,391	0
48	0	3,201,139	0
49	108,400	3,440,593	0
50	0	193,627	0
51	314,032	93,006	0
52	53,200	171,820	0
53	0	2,765,595	0
54	0	622,579	0
55	0	3,455,695	0
56	6,816,568	14,625	0
57	2,018,500	1,361,539	0
58	1,803,200	825,765	0
59	0	453,264	0
60	163,600	179,970	0
61	0	591,331	0
62	0	0	0
Total	**11,508,000**	**55,056,000**	**2,356,797**

APPENDIX B

SECTOR AGGREGATION FROM THE SUPPLY AND USE TABLE 1997

Table 42: Input-Output Table Aggregation from the 1997 Supply and Use Table

Sector	Supply and Use Table Equivalent Sector(s)
Sugarcane	Sugarcane
Other Agriculture	Food Crops, Fishing and Other Agriculture (Other)
Sugar	Manufacturing-Sugar
EPZ Manufacturing	Manufacturing-EPZ (Manufacture of Textiles, Manufacture of Wearing Apparel, Other)
Other Manufacturing	Mining and Quarrying; Manufacturing-Non-EPZ (Manufacture of Beverages and Tobacco; Manufacture of Food Products; Manufacture of Textiles; Manufacture of Wearing Apparel; Manufacture of Leather Products; Manufacture of Wood Products; Manufacture of Paper and Paper Products; Publishing and Printing; Manufacture of Coke and Chemical Products; Manufacture of Rubber and Plastic Products; Manufacture of Non-Metallic Mineral Products; Manufacture of Basic Metals and Fabricated Metal; Manufacture of Machinery and Equipment n.e.c.; Manufacture of Furniture; Other Manufacturing (Other))
Electricity, Gas and Water	Electricity; Water
Construction	Construction (Other)
Wholesale and Retail Trade and Repairs	Wholesale and Retail Trade and Repairs
Hotels and Restaurants	Hotels and Restaurants
Transport, Storage and Communication	Land Transport; Water Transport; Air Transport; Supporting and Auxiliary Transport Activities; Post and Telecommunications
Other Services	Other Agriculture (General Government); Manufacturing-Non-EPZ (Other Manufacturing (General Government)); Other Transport, Storage and Communication (General Government); Financial Intermediation (Banking and Other Financial Intermediation; Insurance); Real Estate, Renting and Business Activities (Real Estate (Owner Occupied Dwellings; Other); Business Activities; Other Real Estate, Renting and Business Activities (General Government; Other); Public Administration and Defense; Education (Other); Health and Social Work (General Government; Other); Other Services (Activities of Membership Organizations; Recreational, Cultural and Sporting Activities; Other (General Government; Other)

APPENDIX C

MATCHING THE SUPPLY AND USE PRODUCTS TO AGGREGATED SECTORS[387]

Table 43: Assignment of Products to the 11- Sector Input-Output Table

Sectors	Corresponding Products in the Supply and Use Table
Sugarcane	Sugar cane (2)
Other Agriculture	Products of Agriculture, Horticulture, and Market Gardening Except Sugarcane (1); Live Animals and Animal Products (3); Forestry and Logging Products (4); Fish and Other Fishing Products (5-29%); Grain Mills Products, Starches and Starch Products (13-2%); Other Food Products Except Sugar (13-2%); Tobacco Products (16-3%); Waste or Scrap (29-12%)
Sugar Milling	Sugar (14)

[387] The numbering inside the parenthesis is the product line number from the Supply and Use Table. If a percentage number is not explicitly stated in the parenthesis, then the product has a 100% assignment to that sector in the Updated Input-Output Table. Otherwise, if a percentage is given, it is the proportion of the commodity assigned to that sector. This also signifies the split adhered to in the Updated Input-Output Table. All percentages across a commodity produced by more than one sector totals 100%. n.e.c. denotes 'not explained elsewhere.'

Appendix C (continued)

EPZ Manufacturing	Fishing and Fishing Products (5-71%); Grain Mills Products, Starches and Starch Products (13-8%); Other Food Products Except Sugar (13-8%); Yarn and Thread (17); Woven and Tufted Textile Fabrics (17); Textile Articles Other Than Apparel (18-76%); Knitted or Crocheted Fabrics (19-97%); Wearing Apparel (19-97%); Leather and Leather Products (20-57%); Footwear (20-57%); Products of Wood, Cork, Straw and Plaiting Materials (21-20%); Pulp, Paper and Paper Products (22-8%); Printed Matter and Related Articles (22-8%); Basic Chemicals (24-19%); Other Chemical Products (25-10%); Man-made Fibers (25-10%); Rubber and Plastic Products (26-20%); Glass and Glass Products and Other Non-Metallic Products n.e.c. (27-3%); Furniture (28-75%); Other Transportable Goods n.e.c. (28-75%); Basic Metals (30-1%); Fabricated Metal Products, Except Machinery and Equipment (31-3%); Electrical Machinery and Apparatus (35-2%); Radio, Television, and Communications Equipment and Apparatus (36-6%); Medical Appliances, Precision and Optical Instruments, Watches and Clocks (37-98%)
Other Manufacturing	Coal and Lignite (6); Peat (6); Crude Petroleum and Natural Gas (7); Metal Ores (8); Stone, Sand and Clay (9); Other Minerals (10); Meat, Fish, Fruit, Vegetables, Oils and Fats (11); Dairy Products (12); Grain Mills Products, Starches and Starch Products (13-90%); Other Food Products Except Sugar (13-90%); Beverages (15); Tobacco Products (16-97%); Textile Articles Other Than Apparel (18-24%); Knitted or Crocheted Fabrics (19-3%); Wearing Apparel (19-3%); Leather and Leather Products (20-43%); Footwear (20-43%); Products of Wood, Cork, Straw and Plaiting Materials (21-80%); Pulp, Paper and Paper Products (22-92%); Printed Matter and Related Articles (22-92%); Coke Oven Products (23); Refined Petroleum Products (23); Nuclear Fuel (23); Basic Chemicals (81%); Other Chemical Products (25-90%); Man-made Fibers (25-90%); Rubber and Plastic Products (26-80%); Glass and Glass Products and Other Non-Metallic Products n.e.c. (27-97%); Furniture (28-25%); Other Transportable Goods n.e.c. (28-25%); Waste or Scrap (29-88%); Basic Metals (99%); Fabricated Metal Products, Except Machinery and Equipment (31-97%); General Purpose Machinery (32); Special Machinery (33); Office, Accounting and Computing Machinery (34); Electrical Machinery and Apparatus (35-98%); Radio, Television, and Communications Equipment and Apparatus (36-94%); Medical Appliances, Precision and Optical Instruments, Watches and Clocks (37-2%); Transport Equipment (38); Maintenance and Repair Services (55-0.1%)
Electricity, Gas and Water	Electricity Distribution Service (47); Gas and Water Distribution Services Through Mains (47)
Construction	Constructions (39-98%)
Wholesale and Retail Trade and Repairs	Wholesale Trade Services (40); Retail Trade Services (41); Professional, Scientific and Technical Services (51-12%); Maintenance and Repair Services (55-95%);
Hotels and	Lodging (42); Food and Beverages Serving Services (42); Professional,

Restaurants	Scientific and Technical Services (51-9%); Maintenance and Repair Services (55-0.1%)
Transport, Storage and Communication	Land, Supporting and Auxiliary Transport Services (43-95%); Water Transport Services (44); Air Transport Services (45); Postal and Courier Services (46); Professional, Scientific and Technical Services (51-9%); Telecommunications Services (53-81%); Information Retrieval and Supply Services (53-81%); Maintenance and Repair Services (55-3%);
Other Services	Constructions (39-2%); Land, Supporting and Auxiliary Transport Services (43-5%); Financial Intermediation, Insurance, Leasing and Auxiliary Services (48); Real Estate Services (49); Research and Development Services (50); Professional, Scientific and Technical Services (51-70%); Other Professional, Scientific and Technical Services (52-100%); Telecommunications Services (53-19%); Information Retrieval and Supply Services (53-19%); Support Services (54); Maintenance and Repair Services (1.3%); Public Administration and Other Services to the Community as a Whole (56); Compulsory Social Security Services (56); Education Services(57); Health and Social Services (58); Sewage and Refuse Disposal, Sanitation and Other Environmental Protection Services (59); Services of Membership Organizations (60); Recreational, Cultural, Sporting and Other Services (61)

APPENDIX D

DOCUMENTATION OF REPORTED DATA IN THE 1997 COMPUTED INPUT-OUTPUT TABLE

D.1 QUADRANT I

The Inter-Industry numbers are aggregated from the 1997 Supply and Use Table from the Government of Mauritius. The eleven industries (Sugarcane (SUG); Other Agriculture (OAG); Sugar Milling (SMI); Export Processing Zone Manufacturing (EPZ); Other Manufacturing (OMA); Electricity, Gas and Water (EGW); Construction (CON); Wholesale and Retail Trade and Repairs (WRT); Restaurants and Hotels (RAH); Transport, Storage and Communication (TSC); and Other Services (OSR)) are aggregated from 54 columns of industry level disaggregation as reported in the Supply and Use table. These eleven industries are reported in the table across 61 goods. Each industry produces a composite good that is comprised of each good in which the industry is the primary producer. To ensure that the secondary industries received their share of total usage of a composite good in an industry (one composite good to one industry, but many suppliers), the supply shares were applied to Use Table to ensure the share of production of the composite good was assigned to each producer of that good.

However, to make the IO Table square (Supply equals Demand), in Quadrant I, numbers were moved across the rows to differing columns, to keep the demand numbers static while adjusting the supply numbers to remove all of the discrepancies between the two. The Export Processing Zone Manufacturing sector reflected a 4.00% supply and demand difference (1,118,690 Rs Thousands). Thus, in the OMA row, I moved 848,073 Rs Thousands from the OMA column to the EPZ column. For the Other Agriculture sector, 270,617 Rs Thousands needed to be moved from the OAG column to the Export Processing Zone Manufacturing column. However, to ensure that I deducted no more than 25% from each cell within Quadrant I, the OAG total had to be transferred from four separate rows. In particular, I transferred 187,872 from the OAG column to the EPZ column in the OAG row. In the Other Manufacturing row, I also moved 67,831 Rs Thousands to the EPZ column from the OAG column. And, I moved 11,747 Rs Thousands from the OAG column to the EPZ column in the TSC row. Lastly, to complete the necessary transfer from the OAG column to the EPZ column, I transferred 3,167 Rs Thousands to the EPZ column from the OAG column in the EGW row.

Also, the Electricity, Gas, and Water demand was larger than its supply by 0.05%. EGW received 155 Rs Thousands from the SUG column and 305 Rs Thousands from the SMI column in the TSC row. In the CON row, I transferred 1,093 Rs Thousands from the CON column into the EGW column. The Wholesale Retail Trade and Repairs sector had a 1.98% difference in its supply and demand (265,864 Rs Thousands). Thus, in the TSC row, I moved 265,864 Rs Thousands to the WRT column from the TSC column. RAH received 41,711 Rs Thousands from the CON column in the CON row that constituted a 0.56% difference in its supply and demand totals. Lastly, the discrepancy found in the Other Services sector had to be removed. Hence, I moved 111,000 Rs Thousands from the Transport, Storage and Communication column in the TSC row; 964,051 Rs Thousands from the OMA column in the OMA row; 209,559 Rs Thousands from the CON column to the OSR column respectively.

The percent difference between supply and demand before the movement across rows was 6.38% in the case of the OMA, but every other percent difference was between [0.00%, 6.28%], with nine sectors having a difference less than 4.00%. Also, as previously stated, there was no single entry in Quadrant I that had more than 25% of its original total deducted from its individual cell. Only in the case of the OAG sector, the needed transfers were split across the OAG, OMA, TSC, and the EGW rows. Please note that the movements were first predicated on those that had usage allocated to other sectors based on the supply allocation share, returning it to the original supplying sector. Then, all other discrepancies were removed after this method was applied. Therefore, a total of 2,712,428 Rs Thousands was transferred within which is only 1.67% of total demand in 1997 or even 3.66% of total inter-industry output/usage.

D.2 QUADRANT II

The composite commodity household and government consumption, gross domestic fixed capital formation, change in inventories and exports of goods and services for each industry was assigned to its respective producer by the total share of that producer in its supply. Thus, the supply allocation numbers were again employed to calculate the total final demand by demand type.

The Trade Margin and Transport Margin were calculated from the Supply and Use Table, Supply Table 5.1 (located in Appendix A). They were calculated by the assignment matching rule as given above. The Trade and Transport Margins should equal zero, with Wholesale and Retail Trade and Repairs (WRT) having all goods flow through it for accounting purposes (the sum of all goods traded margins are equal to the negative that the Wholesale and Retail Trade and Repairs industry is charged). Similarly, the Transport Margin is filtered through the Transport, Storage and Communications sector, with a value of 1,014,985 Rs thousands. Trade Margins and Transport Margins as calculated by industry were subtracted from household consumption column resulting in household consumption before trade and transportation costs are measured.

Investment, or gross domestic fixed capital formation (GDFCF), since it was calculated instead of given, contained small negative numbers ranging from [-8, -300]. As a result, the –776 Rs thousands is moved into the change in inventories column that totals 2,356,797 Rs thousands prior to its inclusion (thus a 0.03% change to the column). Likewise, the GDFCF column experienced a 0.003% change in its previous total due to the adjustment. It totaled 23,481,000 Rs Thousands prior to the change. Thus, I am confident that the changes will not greatly impact the results of the model.

Imported Goods and Services (CIF) is calculated by the eleven industries used in the model from adding the Imports of Goods and Imports of Services columns of the Supply and Use Table Supply Table 5.1 with the CIF/FOB Adjustments column. Since certain goods had more than one producer, in this case, the goods were assigned each industry by the primary producer (largest producer of a product gets that product assigned to it in the matching of products to industry process). The Imports of Goods and Services (CIF) totals are deducted from the Exports of Goods and Services column, to reflect net imports in the final demand section of the IO Table.

Imported final demand totals are included in the Household Consumption, Government Consumption, and Gross Domestic Fixed Capital formation columns. However, to account for imported final demand separately, from the 1997 IO Table sent by the Central Statistics Office later on, I gleaned the allocation shares of imports for both the intermediate and final demands. The proportions of imports from each industry were maintained as the share of total imported intermediate demand and total imported final demand was applied. In the case of EPZ sector, 2,118,612 Rs Thousands was assigned to imported intermediate demand to account for the total final demand available for 1997 (only 4,845,183 Rs Thousands total final demand existed, but share totals would have assigned 6,963,795 Rs Thousands to the sector using the share of imports for final demand share). The total imported final demand is 27,584,518 Rs Thousands. Thus, the remainder of 32,287,413 Rs Thousands was assigned to the Inter-industry total imported goods and services. Then, maintaining the proportions by industry for household consumption, gross domestic fixed capital formation, change in inventories and exports of goods and services, I removed the imported final demand from each.

D.3 QUADRANT III

D.3.1 Row B1

The Import Duties row B1 has 6,157,000 Rs Thousands divided across the eleven industries. This is based on the tariff rates found for 1997-2000. The values of total tariff revenue come from the Central Statistics Office of the Government of Mauritius. The tariff rates data comes from the http://ncb.intnet.mu/mof/budget/19981999/tariff.doc and http://ncb.intnet.mu/mof/budget/19992000/index.html by the Ministry of Finance (both accessed February 10, 2003). The tariff rates were then grouped by industry using the Harmonized

System of Tariffs 1996 and the International Standard Industrial Classification, Revision 3. The rates included in the model are the average of the rates reported that would have applied to 1997. There are a total of 1,695 records that were used to calculate the averages found. And, since in 1997, the total imports of goods and services are known, I found the tariff revenue for 1997. The tariff rates are adjusted downwards by 42% to match the total revenue for 1997 of 6,157,000 Rs Thousands. An adjustment was made to the 2000 calculated tariff rates, scaling them downward to reflect the 2000 revenues.

D.3.2 Row B2

The total taxes on products as given by the Supply and Use Table of 11,147,000 Rs Thousands was added to the Other Taxes on Production reported in an e-mail correspondence with the Central Statistics Office, Government of Mauritius. Thus, total taxes for the economy as given in the IO Table are 11,913,000 Rs Thousands. Import duties were taken from another e-mail correspondence that reported revenues and grants by fiscal year for the Government of Mauritius. Using the shares for each industry for the Taxes on Products gleaned from the Supply and Use Table, I calculated the import duties as well as the taxes on products row.

Taxes on Products row B2 have 5,756,000 Rs Thousands divided based on the assignments found by product to industry directly given from the 1997 Supply and Use Table. But, the Taxes on Products row is defined as the difference of total Taxes on Products less the Import Duties (Row B1).

Please note that the 766,000 Rs Thousands reported as Other Taxes on Products was distributed such that the subtraction of import duty revenues did not cause total taxes for any sector to be negative. Non-negative revenue was ensured by assigning 109,339 Rs Thousands to OAG and 244,033 Rs Thousands to EPZ. Share numbers based on the Taxes on Products was employed to assign the remaining 412,628 Rs Thousands not allocated to either the OAG or the EPZ sectors.

D.3.3 Row B3

The Subsidies on Products row was calculated from the Supply and Use Table, Supply Table 5.1. It was calculated by the primary producer matching rule as given in Quadrant II documentation for the Imports of Goods and Services (CIF) column above.

D.3.4 Row B4 and B5

Row B4, Compensation of Employees and Row B5, Gross Operating Surplus, both come from Table 1.15 – Production and Generation of Income Accounts by Kind of Economic Activity, 1997-1999 via an e-mail correspondence with the Central Statistics Office, Government of Mauritius. Further aggregation by sector occurred to match what was presented in Table 1.15

with the 11 sectors of the 1997 Input-Output Table computed by the Author. In particular, Other Agriculture is defined as the aggregate of Agriculture, Hunting, Forestry and Fishing-Foodcrops, fruits and flowers, Livestock and poultry, Fishing and Other economic activities; Other Manufacturing is the aggregate of the Mining and Quarrying and the Manufacturing-Other economic activities; Wholesale and Retail Trade and Repairs as the aggregate of Wholesale and Retail Trade, Repair of Motor Vehicles, Motor Cycles, Personal and Household Goods-Wholesale and Retail Trade and Other sectors; Transport, Storage and Communication defined as the aggregate of Transport, Storage and Communication-Transport and Storage as well as the Communication economic activities; and Other Services defined as the aggregate of Financial Intermediation-Insurance and Banking and Other Financial Institutions; Real Estate, Renting and Business Activities-Owner Occupied Dwellings and Other; Public Administration and Defense; Compulsory Social Security; Education; Health and Social Work; and Other Services economic activities.

In Row B5, the rounding discrepancy for the Supply (sum of the columns) was removed through subtracting 3 Rs Thousands from the OMA column. Thus, I removed 3 Rs Thousands from 5,062,300 Rs Thousands, making its new total equal 5,062,297 Rs Thousands.

APPENDIX E

INDUSTRIAL CLASSIFICATION CORRESPONDENCE TO SECTORS

Table 44: Industrial Classification Correspondence to the Input-Output Table by Sector

Sectors	Corresponding Four-Digit Industrial Classification Code*
Sugarcane**	N.A.
Other Agriculture	0111, 0112, 0113, 0121, 0122, 0200
Sugar Milling	1542
EPZ Manufacturing	0500, 1512, 1711, 1721, 1722, 1723, 1729, 1730, 1810, 1820, 1911, 1912, 1920, 3311, 3312, 3313, 3320, 3610, 3691
Other Manufacturing***	1010, 1020, 1030, 1110, 1320, 1410, 1421, 1422, 1429, 1511, 1513, 1514, 1520, 1531, 1532, 1533, 1541, 1543, 1544, 1549, 1551, 1552, 1553, 1554, 1600, 2010, 2021, 2022, 2023, 2029, 2101, 2102, 2109, 2211, 2212, 2213, 2219, 2221, 2222, 2310, 2320, 2330, 2411, 2412, 2411, 2412, 2413, 2421, 2422, 2423, 2424, 2429, 2430, 2511, 2519, 2520, 2610, 2691, 2692, 2693, 2694, 2695, 2696, 2699, 2710, 2720, 2811, 2812, 2813, 2893, 2899, 2911, 2912, 2913, 2914, 2915, 2919, 2921, 2922, 2923, 2924, 2925, 2926, 2927, 2929, 2930, 3000, 3110, 3120, 3130,3140, 3150, 3190, 3210, 3220, 3230, 3410, 3420, 3430, 3511, 3512, 3520, 3530, 3591, 3592, 3692, 3693, 3694, 3699
Electricity, Gas, and Water	4010, 4020
Construction**	N.A.
Wholesale and Retail Trade and Repairs****	…
Restaurants and Hotels****	…
Transport, Storage, and Communication****	…
Other Services	7421, 7494, 9211, 9214

Appendix E (continued)

*Only the goods and services that were traded in 1997 are explicitly assigned an Industrial Standard Classification Code.
**Sugarcane and Construction goods and services are not traded and hence were not assigned an ISIC code for 1997.
*** The Other Manufacturing sector contains the Mining and Quarrying sector and hence has the following ISIC numbers assigned to it: 1010, 1020, 1030, 1110, 1320, 1410, 1421, 1422, and 1429.
****Wholesale and Retail Trade and Repairs, Restaurants and Hotels, and Transport, Storage, and Communication sectors would have been under ISIC Code 7421. However, I simply that classification under the Other Services sector since there was no clear way of splitting it up.

APPENDIX F

VALUE-ADDED TAX GOODS AND SERVICES EXEMPTIONS[388]

Part B: Goods Exempted from VAT[389]

Section 1: Description of Exempted Goods and Their Customs Tariff Numbers

Heading No.	Description	Item of First Schedule
01.02	Live bovine animals.	10
01.03	Live swine.	10
01.04	Live sheep and goats.	10
02.01 to 02.06	Meat and edible meat offal; pig fat and poultry fat.	7(b)
02.08 to 02.10		
03.01 to 03.07 (part)	Fish (*other than ornamental fish, smoked fish and processed fish produced in and exported from Mauritius*), crustaceans, mollusks and other aquatic invertebrates.	7(a)
04.01	Milk and cream (*other than sterilized liquid milk*) concentrated nor containing added sugar or other sweetening matter.	6
04.02 (part)	Milk and cream (*other than sterilized liquid milk*) concentrated or containing added sugar or other sweetening matter.	6

[388] Republic of Mauritius VAT Department, September 1, 1999.

[389] Part A of the schedule is not recorded since it is the First Schedule to the Value-Added Tax Act 1998. Part B has four sections: Description of exempted goods and their Customs Tariff Nos., Unprocessed agricultural/horticultural produce and molasses, Customs procedure code of certain exempted goods, and Water, Electricity and Telephone exempted from VAT. Part C details the Services exempted from VAT. All parts are written verbatim from the VAT pamphlet detailed in Chapter 2.

Appendix F (continued)

04.03 (part)	Buttermilk, kephir and other fermented or acidified milk and cream.	6
04.04 (part)	Whey.	6
04.05	Butter and other fats and oils derived from milk.	4.5
04.06	Cheese and curd.	6
04.08 (part)	Birds' eggs, not in shell and egg yolks, fresh or dried.	7(c)
04.09	Natural honey.	7(c)
05.04	Guts, bladders and stomachs of animals (other than fish), whole and pieces thereof.	7(b)
06.01 (part)	Bulbs and plants, used for planting.	31
06.02 (part)	Plants used for planting.	31
07.01 to 07.09	Vegetables (*other than those produced in and exported from Mauritius*), fresh or chilled, including tomatoes, potatoes and onions.	7(c)
07.12	Dried vegetables (*other than those produced in and exported form Mauritius*) whole, cut, sliced, broken or in powder, but not further prepared, including tomatoes, potatotoes and onions.	7(c)
07.13	Dried leguminous vegetables, shelled (*other than those produced in and exported from Mauritius*)	7(c)
07.14	Manioc, arrowroot, salep, Jerusalem artichokes, sweet potatoes and similar roots and tubers with high starch or inulin content, fresh or dried; sago pith (*other than those produced in and exported from Mauritius*)	7(c)
08.01 to 08.10	Edible fruits and nuts (*other than those produced in and exported from Mauritius*)	7(c)
08.13	Fruit (*other than those produced in and exported from Mauritius*), dried, other than that of heading Nos. 08.01 to 08.06; mixtures of nuts or dried fruits of Chapter 8.	7(c)
08.14	Peel of citrus fruit or melons (*other than those produced in and exported from Mauritius*).	7(c)
09.01 (part)	Raw coffee; coffee husks and skins.	7(c)
09.02 to 09.10	Tea, mate and spices.	7(c)
10.01 to 10.08	Cereals, including wheat, maize and rice.	1, 2, 7(c)
11.02	Cereal flours excluding flours of wheat or meslin.	2
11.03 (part)	Cereal groats and meal.	7(c)
11.05	Flour, meal and flakes of potatoes.	7(c)
11.06	Flour and meal of the dried leguminous vegetables of heading No. 07.13, of sago or of roots or tubers of heading No 07.14; flour, meal and powder of the products of Chapter 8.	7(c)
11.07 (part)	Malt, not roasted.	7(c)

12.09	Seeds, fruit and spores, of a kind used for sowing.	31
12.12 (part)	Sugar beet and sugar cane; fruit stones and kernels and other vegetable products of a kind used primarily for human consumption, not elsewhere specified or included.	7(c)
15.01 to 15.16	Animal or vegetable fats and oils (*other than edible oils*)	4, 5
16.01 to 16.05	Preparation of meat (*other than canned meat produced in and exported from Mauritius*), of fish (*other than canned tuna and processed fish produced in and exported from Mauritius*) or of crustaceans, mollusks or other aquatic invertebrates.	7(a), 7(b)
18.01	Cocoa beans, whole or broken.	7(c)
19.01 (part)	Preparation for infant use of goods of heading Nos. 04.01 to 04.04.	8
19.05 (part)	Bread.	3
21.06 (part)	Soya bean protein cakes or chunks.	7(d)
23.03	Bagasse.	33
25.01 (part)	Common salt.	9
27.10 (part)	Kerosene, kerosene jet type fuel.	44
29.41	Antibiotics *other than those produced in and exported from Mauritius*.	37
30.01 to 30.04	Pharmaceuticals products *other than those produced in and exported from Mauritius*.	32
38.03 (part)	Herbicides.	34
49.02 (part)	Journals and periodicals.	17
87.13	Invalid carriages.	15
88.02	Aircrafts.	39
89.01	Ships for the transport of persons or goods or both persons.	40
89.02	Fishing vessels; factory ships and other vessels for processing or preserving fishery products.	41
90.21	Orthopaedic or other appliances or articles.	15
97.01 to 97.06	Works of art, collectors' pieces and antiques.	42

Section II: Unprocessed Agriculture/Horticultural Produce and Molasses

Heading No.	Description
06.01	Bulbs, tubers, tuberous roots, corms, crowns and rhizomes, chicory plants and roots other than roots of heading No. 12.12.
06.02	Other live plants, cutting and slips; mushroom spawn.
06.03 (part)	Cut flowers and flower buds of a kind suitable for bouquets or for ornamental purposes, fresh.
06.04 (part)	Foliage, branches and other parts of plants, without flowers or flower buds, and grasses, mosses and lichens, being goods of a kind suitable for bouquets or for ornamental purposes, fresh.
12.01 to 12.07 (part); 12.10 to 12.11 (part); 12.13 (part)	Oil seeds and oleaginous fruits, fresh; miscellaneous grains, seeds and fruits, fresh; industrial or medicinal plants, fresh; straw, unprocessed.

The goods mentioned below are exempted from VAT when supplied to planters, for a consideration or otherwise.

Molasses.

Section IV: Water, Electricity and Telephone[390]

Description	Item of the First Schedule
1. The first 15 cubic meters of water per month supplied by the Central Water Authority for domestic purposes and the renting out of a meter and the carrying out of infrastructure works by the Authority.	29
2. Water for irrigation.	35
3. The first 50 kilowatts of electricity per month supplied by the Central Electricity Board for domestic purposes and the renting out of a meter, the reconnecting of electricity supply and the carrying out infrastructure works by the Board.	28
4. The renting of telephone lines and the renting for internet access.	36

[390] Section III of the schedule is not recorded since it outlines customs procedure of code certain exempted goods.

Part C Services Exempted From VAT

1. Medical, hospital and dental services including clinical laboratory services, services provided in a health institution and veterinary services.

   Health institution is defined in the Private Health Institutions Act 1989 as including a clinical laboratory, a health care unit, a hospital and a nursing home.

2. Educational and training services.

3. The transport of passengers by public service vehicles excluding contract buses for the transport of tourists and contract cars.

   Public service vehicle is defined in the Road Traffic Act as – "public service vehicle" means a motor vehicle used for carrying passengers for hire or reward.

4. (a) Charges under a hire purchase agreement or under a finance lease agreement.

   (b) Stamps and Postal services under the Post Office Act.

5. Aircraft leasing and helicopter services.

6. The transport of passengers by sea or air and cargo handling services in respect of goods so transported-
   (a) from or to Mauritius;
   (b) from or to the Island of Rodrigues;
   (c) from or to the Outer Islands; or
   (d) from a place outside Mauritius to another place outside Mauritius.

7. Entrance fees to any event in respect of any sport discipline specified in the Physical Education and Sport (Designation of Sport Disciplines) Regulations 1986.

   The sport disciplines are-

Part I Olympic Sport Disciplines	Part II Non-Olympic Sport Discipline
1. Archery	1. Aikido
2. Athletics	2. Billiard
3. Basketball	3. Badminton
4. Boxing	4. Bodybuilding
5. Cycling	5. Cricket
6. Equestrian	6. Dart
7. Fencing	7. French boxing
8. Football	8. Golf
9. Gymnastics	9. Ju-jitsu
10. Handball	10. Karate
11. Hockey	11. Karting

12. Judo
13. Shooting
14. Swimming
15. Tennis
16. Volleyball
17. Weightlifting
18. Wrestling
19. Yatching
20. Canoeing
21. Diving
22. Modern pentathlon
23. Rowing
24. Synchronized Swimming
25. Water polo
26. Table tennis

12. Motor racing
13. Petanque
14. Squash
15. Tennis volley
16. Rugby
17. Roller-skating
18. Taichichuan
19. Tae Kwondo
20. Triathlon
21. Underwater diving
22. Water skiing

8. The renting of, or other grant of the right to use, accommodation in a building used predominately as a place of residence of any person and his family, if the period of accommodation for a continuous term exceeds 90 days.

9. The grant, assignment or surrender of any interest in or right over land or of any license to occupy land liable to Registration Duty under the Registration Duty Act.

10. The sale or transfer of an immovable property, or the construction, sale or transfer of a building or part of a building, flat or tenement used for residential purposes.

11. Burial and cremation services.

12. The following financial services-

(a) banking services (other than offshore banking services supplied to persons not resident in Mauritius) including the issue, transfer or receipt of, or any dealing with, money, any security for money or any note or order for the payment of money and the operation of any current, deposit or savings account;

(b) services provided by foreign exchange dealers and money changers;

(c) the issue, transfer or receipt of, or dealing with any stocks, bonds, shares, debentures and other securities, including the underwriting and the settlement and clearing of such securities;

(d) the issue of transfer of ownership of a unit under any unit trust;

(e) the management of investment funds and of pension funds;

(f) the arrangement, provision, or transfer of ownership, of any contract of insurance or reinsurance under the Insurance Act 1987; and

(g) financial services prescribed are-

(i) The making, the advance or the granting of credit.

(ii) The granting of, or dealing in, credit guarantees or other securities for money and the management of credit guarantees by the person who granted the credit.

(iii)The provision, or transfer of ownership, of an interest in a superannuation scheme, or the management of a superannuation scheme.

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